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EDITORIAL NOTES.

Preparations for the Liverpool Meeting.

SEVEN weeks from to-day, the members of the Institution of Gas Engineers will be meeting at Liverpool, under the presidency of Mr. Edward Allen, M.Inst.C.E. The occasional break from the London meeting is something to which we all look forward, as meetings in the Provinces always carry with them not only a sense of change, but pleasant memories of hospitality and many acts of kindness on the part of the local rulers and representatives of the gas undertakings of the centres visited. Liverpool will supplement previous experiences; for we may be quite sure the magnificent and world-famed city and the Chairman (Mr. H. Wade Deacon, J.P.) and Directors of the Liverpool Gas Company will show a cordiality in the expression of their welcome which will be second to none in the history of meetings of the Institution away from the Metropolis.

On the present occasion, however, it is the technical side of the meeting that claims consideration. The papers that will be read and discussed only number four; and we are not sorry to see that in this connection there has been a curtailment which will relieve the time-pressure of the proceedings. But the number of papers is no measure of the technical interest that awaits the members at their annual meeting. Technical interest is now served up on these occasions in another form than by means of prepared papers. It is the Committee system under which investigation is made and the research work that is now conducted at the Leeds University under the direction of the occupant of the Livesey Chair (Professor J. W. Cobb) that have not only opened up new channels of interest, but have helped to alter the complexion of the meetings; and we think, from the indications of the programme that was settled by the Council at their meeting at Leeds last Thursday [see later columns], that the forthcoming meeting will, if anything, present an extension of this change. Incidentally, it may be remarked here that we are glad to observe that Professor Cobb and Mr. H. P. Maybury, Chief Engineer to the Road Board, have been nominated as Honorary Members of the Institution.

The Presidential Address will, of course, form the frontispiece to the technical proceedings; and the mature experience of Mr. Allen will, there is good assurance in saying, give food for thought on a diversity of topics. What has become an interesting and important standing dish will be the report of the Refractory Materials Committee, which will be presented by Mr. F. J. Bywater, upon whom rests the credit for the action that resulted in the appointment of the Committee. The Institution Gas Research Fellows will come before the members, and report on the result of their work. They will direct attention into certain higher realms of research which cannot well be conducted on gas-works, where more immediate practical work completely "fills the bill." As Professor Harold B. Dixon was recently saying, the teachings of investigations into the higher chemical and physical problems at some time or other do and must find place in which they fit into progress and the practical work of everyday life. The former holder of the fellowship (Mr. Harold Hartley, M.Sc.) will report as to the work he has carried out, under the direction of Professor W. A. Bone, F.R.S., on the "Electrical Condition of a Gold Surface during the Ab-"sorption of Gases and their Catalytic Combustion." Two communications will be made by the present fellow, Mr. Harold Hollings, B.Sc., in conjunction with Professor Cobb, which cannot fail to have a very practical bearing. They will deal with the "Thermal Phenomena in Carboniza-"tion," and the "Influence of Red-Hot Coke and Radiant "Heat on the Gaseous Products of Carbonization." These are both subjects upon which gas engineers want to know more, for there is rather a large diversity of opinion upon both of them; and much that is accepted as true is the result of more or less exact observation, and not of actual scientific investigation. Following this there will come the first report of the Ventilation Research Committee, to be presented by the Chemist to the Committee, Mr. William Harrison, of Leeds. From what has just been said it will be seen that the Department of Coal Gas and Fuel Industries of the Leeds University has been particularly busy in the interests of the gas industry.

What will be another special feature will be the lecture on "Purification by Heat: A Century's Progress and its Lessons," by Mr. Charles Carpenter, D.Sc., in which we shall hear further as to the catalytic or heat process of purification which has received such large adoption, and is to be applied generally, at the works of the South Metropolitan Gas Company. The paper read on the subject by Mr. Carpenter before the Société Technique last June, and a translation of which was immediately afterwards published in our columns, largely sharpened curiosity as to the process and the results; and there will be a very general desire to hear more as to the further experiences with a process with which the name of Evans is associated, and which has been so patiently developed in face of many disappointments and a substantial expenditure of time and money, but with constant encouragement and assistance, and an unswerving belief in ultimate success (which has now been attained), on the part of Mr. Carpenter himself. We almost regret that the communication is described as a lecture, because this suggests that no discussion will follow, and there may be some present at the meeting who would like after the lecture to obtain further elucidation of, and an extension of information upon, points that may to those who have not been intimately associated with the work appear to be still a little obscure.

As to the papers, a hearty reception will be given to Mr. B. K. Schieldrop, of Bergen, who will introduce "Some "Novelties in Gas-Works Practice from Norway." It was really about time that there was a general discussion at a meeting of the Institution on the subject of "Calorific Power "as a Standard;" for while the matter has hardly been looked at in conference by British gas engineers, it has become a very live subject in the parliamentary arena, where the author of the paper that is to be presented—Mr. Jacques Abady—as a member of the Parliamentary Bar, is one of the participating parties. The present engagement with the Institution, we believe, was made before Mr. Abady was briefed in connection with various Bills in which the subject of calorific value is being dealt with this session. Mentioning which, it may be remarked that, before the meeting in June, the gas industry will be in possession of the verdict regarding the calorific power standard of the House of Lords Committee, who, it is expected, will to-day commence consideration of the matter in connection with the Gas Light and Coke Company's Bill. We are glad to see the recognition by the Council of the Institution of the good work of the Junior organizations, by including in the programme a paper by one of the members of the Scottish Junior Association—Mr. George T. Purves. His subject will be a double-barrelled one, and full of current interest in view of technical tendencies in gas-works. The title of the paper is "The "Application of Coke-Ovens and 'Otto' Direct Ammonia "Recovery to Gas-Works Requirements," in both of which directions it seems likely that considerable developments will take place in large gas-works practice. Suitably, there will follow a paper by that gas veteran, Mr. John West. Well abreast of the affairs of the time, he does not concentrate all his thoughts upon gas-works practice, but makes excursions into other regions that have identity with the interests of the gas industry. He will discourse on the "Value of Sulphate of Ammonia and Gas Lime as Ferti-"lizers;" and we take it there will be personal experience embodied in his communication.

This is a varied technical programme; and there is confidence in saying that, when the framework here presented is filled in next June, the members will vote the meeting one of the most valuable from the technical point of view during recent years.

Ways and Means of Business Development.

A PERFECT torrent of excellent advice to gas undertakings is issuing from the divisional meetings of the British Commercial Gas Association that are being held in different parts of the country; and if all the counsel and constructive business methods that are being put forward were zealously adopted, or, at any rate, those that are applicable to individual gas undertakings, the industry, taken as a whole, would assuredly find its pace quickened in making for solidarity and expansion. Last week there was one of these divisional meetings at Newport (Mon.), and yesterday another at Redhill. At the former town and at the latter, the local gas undertakings, and those responsible for their administration and management, did generous part in making the delegates welcome, and in producing success. Conferences of the kind cannot fail to have a marked stimulating effect in cultivating a higher standard of commercial efficiency; and an industry whose phases have changed so materially as have those of the gas industry, through the dual operations of new applications for its primary commodity and an enlarged competition with that commodity and the secondary products of its manufacture, cannot fail to benefit from the laying together of progressive heads, and the bringing together of experiences. We pride ourselves that the gas industry, speaking generally, has not been slow to realize that fundamental changes in its commercial conditions demand radical changes in its trading methods. It will always stand to the credit of the British Commercial Gas Association that it has taken no small part in facilitating, fostering, and stimulating work to this end. The main functions of the Association lie among the public; but we may claim for it that, during the short time of its existence, it has done much to energize and heighten interest among the administrators and executive officials of the industry in the ways and means of business development.

The papers that are read at the divisional conferences are not by the staff officers of the Association, but by the chief officers of gas undertakings of all degrees that are ranked in the membership of the Association. Membership of the Association will soon be, if it is not already, one of the hallmarks of the highest standards of commercial progressiveness in the gas industry; for men who believe in the efficacy of joint and general propaganda work, and the influence of a central representative agency, are the men who in their individual local spheres are bound to apply the best of ideas that their own intuitive and initiative faculties produce, and that their power of selection enables them to utilize advantageously. The very act of participating in conference reveals the broad mind that does not believe that the whole power of initiative and correct discernment of ways and means is concentrated in any one person; and participation also indicates a willingness not only to receive but to impart. A broad philosophy is to be found in these commercial conferences, with their one aim of stimulating interest and affording opportunity for the discussion of trading ways and means. This broad philosophy is to be seen in the prepared communications made by Mr. George Clarry and Mr. Arnold W. Branson at the Newport conference, and by Mr. R. W. Edwards at the Redhill one. These papers are published in this week's issue of the "JOURNAL," together with a report of the proceedings at the former conference. That of the Redhill proceedings has, through exigent time, to be deferred until next week, when there may be other matters—such as the address of Mr. Thomas Canning at Newport and that of Mr. W. J. Sandeman at Redhill—to which editorial reference may be made.

To discuss the three papers and all the contained suggestiveness in detail would occupy more space than can be devoted to them in this part of the "JOURNAL." But there are a few features upon which a little special attention may be bestowed. The communication by Mr. Clarry was devoted to the objects and the advantages of the work of the British Commercial Gas Association. The paper was opportune, because there is the evidence, in a large abstention of the smaller undertakings of Wales and Monmouthshire, of a marked failure to understand the value of the work of the central organization whose publicity, educational, information gathering and imparting, and industrial representation work is carried on in channels that would not be, and could not be, entered upon with such system, power, and effect by any individual concern—large or small. The smaller undertakings should have no difficulty in recognizing their obligation to support the larger ones in what they are doing. It is a reproach to Wales and Monmouthshire that of 119 gas undertakings only 23 (representing 44 per cent. of the sales of gas) are enrolled in the membership of the Association. Mr. Clarry and all of the representatives of the subscribing concerns in Wales and Monmouthshire are anxious to see this reproach removed, and further support rendered to the ideal in industrial trading propaganda of a strong collective agency heading work that local effort does not touch. Mr. Clarry made a striking point when he alluded to the fact that the twelve largest membership concerns in Wales have an average annual sale of 25,500 cubic feet of gas per consumer, while the twelve largest non-subscribing concerns have an average sale of only 17,500 cubic feet—that is to say, the membership undertakings have a sale per consumer 45·26 per cent. in excess of the non-membership concerns. We do not think that Mr. Clarry would claim that this difference is due any more than in part to the life of the Association, inasmuch as the effects of its work have no bounds. But still it is significant that any large difference should exist. Local conditions and opportunity have weight in creating divergent sale curves per consumer as between undertakings; but we revert to the point already made in this article to the effect that the highest administrative progressiveness is found and is operative where there is full recognition of the importance of united industrial endeavour. Where there is this recognition, there too will, as a rule, be found the greatest local trading effort. We know of concerns that seem to have retired farther and farther into seclusion through an obstinate reluctance to take part in the national gas movement. The effect is anything but to their commercial advantage and industrial status. As we look at these concerns, and remark how little is now heard of them, and how little are seen their chief executive officers, there is a natural amazement.

Those who read the polished and highly suggestive paper by Mr. Edwards at the Redhill conference, together with that contributed by Mr. Branson to the Newport conference, will be, as we have been, struck by the fact that the two authors have much in common in their methods under distinctly varying circumstances—"varying" excepting in that both the Aldershot District Gas Company and the Rhymney and Aber Valleys Gas Company have large areas of supply, with segregated populated districts, and not concentrated areas such as are possessed by some undertakings. Concerns similarly situated in respect of area and divided populations cannot all do precisely the same. The Rhymney and Aber Valleys Company cannot carry out to the degree of completeness and refinement in method all that the more affluent Aldershot Gas Company can do; and perhaps it is hardly necessary, seeing the difference in the characteristics of the populations. Still, in miniature, Mr. Branson does give effect to much the same ideas in his area as Mr. Edwards does in his. Both believe in having live local representation in the separate populated areas for commercial and communication purposes; and although Mr. Branson cannot have such high-class men as district representatives, nor have such a complete staff at each centre, as Mr. Edwards can afford, there is the same idea permeating his practice in keeping in close touch with his out-districts and the business in them. He has his showroom in each district; and so has Mr. Edwards, but on a more palatial scale. The local residents are encouraged to regard the local show-room as the Company's local office; and from the local office the same service is rendered as from the central office. Both authors are convinced that good and prompt service stands head and shoulders above all else in producing satisfaction; and with this there can be no disagreement. Mr. Edwards is a great believer, too, in individual responsibility, and in encouraging the district men to look upon their effort as part of their stock-in-trade—the more an individual's effort is exercised and produces result, the greater the profit to him. The districts, too, are graded, with remuneration for the positions so fixed that transference provides for promotion. Local responsibility has, of course, its central head at the chief office. It may be said there is nothing new in all this, nor in the ideas in the paper as to the education of representatives in the matters of efficient use of appliances and in promoting in them an appreciation of the merit of greater artistic application of gas lighting. But the advocacy is here presented in attractive colours; and Mr. Edwards finds the fruits of the constructive commercial policy that he favours distinctly of the refreshing order. It all pays. The same thing is found by Mr. Branson, to the length that he is able to give effect to

the plans. The latter gentleman acknowledges that he does not in his mining villages see payment all represented in hard cash in the local till, but what is short there is more than compensated for by the extension and maintenance of business among a satisfied *clientèle*.

This is only one of the subjects dealt with in the papers; but the schemes of business-getting are all summed up in Mr. Edwards' words—"Quality, Service, Price." The three words could be adopted as texts for long discourses; but they, standing alone, prompt and promote thought. We will let them so stand here; making only one further suggestion, and that is that Mr. Branson's success in the carcassing of new small houses, each at a small loss, and getting the tenants as ordinary gas consumers, should be particularly noticed.

The Carbon Monoxide Phantom.

It is a somewhat common thing to have people of whom one has never heard before springing into view through meddling with matters about which they know but little. Mr. R. Spencer, F.C.S., of Barrow-in-Furness, who has not before been known to the gas industry at large, has introduced himself to it, through the annual conference of the National Chamber of Trade. As will be seen from the report in our "Miscellaneous News," his only knowledge of the subject upon which he clamours for legislation is from the ancient and dust-begrimed tome containing the report and proceedings of the Home Office Committee who considered the question of the supply of carburetted water gas in 1899, supplemented by an investigation that he has made of the last-issued returns of the Board of Trade relating to gas undertakings to ascertain what is the maximum percentage of carburetted water gas distributed in town gas, because, as an F.C.S., he is aware that the constituent carbon monoxide is a dangerous gas. This is all very interesting, but Mr. Spencer appears to have travelled far before finding out what the gas industry knew, what the Home Office knew, and what many eminent chemists knew long since. He therefore wants the Legislature at this late hour to step in, and impose a restriction upon the gas industry in accordance with the recommendations of the Departmental Committee of 1899. The National Chamber of Trade were sympathetic, and passed a resolution accordingly; and there the matter is likely to rest.

With the Home Office report before it, and fourteen years' experience accrued since that report, Parliament has not found any occasion to interfere, and impose restriction in the matter of the use of carburetted water gas. Mr. Spencer is unaware of the fact that the matter has since been spasmodically raised by certain pragmatists; and only a few sessions ago, it was again discussed before one of the Select Committees of Parliament considering a Private Gas Bill. From what transpired then, Mr. Spencer may take it from us that, if the members of the Departmental Committee were making their report to-day, they would not submit the same recommendations on the evidence that could now be advanced. Dr. Haldane was one of the members of the Home Office Committee; and, on a Speaker's Order, he was called to give evidence by those who sought to impose restriction upon the Gas Company whose Bill was being considered by the Select Committee in question. The result was the exact opposite of the one that those who sought restriction had anticipated. The learned Doctor did not support the position taken up by the Departmental Committee. He frankly admitted that he and his fellow-members were in 1899 influenced in their recommendations by what had happened in America, where some undertakings supplied neat, and many practically neat, carburetted water gas; and the Committee feared that something of the same kind would occur in this country. But that would never happen in a country where coal is a product of the earth and oil is not. When commenting upon Dr. Haldane's evidence before the Select Committee referred to, it was remarked in these columns:

> The fear of the Committee in those days, in the light of the explanation now given, was somewhat of a slight upon the discretion of the administrators of gas undertakings. But Dr. Haldane does not hesitate to say now (and we give him full credit for the recognition) that the managements of gas undertakings have themselves in the passing years shown wisdom in this matter, and have largely removed the requirement for restrictive legislation, though he thinks that some credit may be taken for the moral effect of the report of the Home Office Committee. Another matter that he pointed out was that the conditions of the use of gas have in the meantime changed, in that a comparatively small amount of gas is required in (and so a comparatively small amount could, through a tap being accidentally left open, escape into) a room now with the incandescent burner, compared with a dozen years ago when the flat-flame burner was still very commonly used. In addition, the proportion of gas consumed in the daytime (when escapes would be readily detected) has been advancing by leaps and bounds.

From this Mr. Spencer will see that one of his props for restriction has dropped away from him through age, experience, and changed circumstances.

We come to his discovery in the Board of Trade returns that the maximum percentages of carburetted water gas ranged in the year covered by them from 2¼ per cent. up to 67 per cent. We will make him a present of the fact that there was one gas undertaking that had a temporary maximum that year of 98 per cent.; and so it could not in the brief space during which this occurred have got much closer to the supply of neat carburetted water gas. But was Mr. Spencer fair in this matter of the maximum percentages of carburetted water gas supplied? If the report in other columns is a true presentment of the case he laid before the National Chamber of Trade, we say that he was not. High carburetted water-gas percentages of the kind are not general in the gas industry. They were not general in 1912; and the fact that there were temporarily—perhaps for a few hours only—maxima percentages as high as 40 to about 50, and in some half-dozen cases higher, was in the main due to the coal strike of that year; and the supply was therefore a public convenience and for public safety. During the period of the strike the conditions were exceptional; and yet Mr. Spencer would find it difficult to advance evidence of any regrettable event having occurred during the brief time of the higher temporary maximum use of carburetted water gas. Our would-be restricters may take it as true that the general practice of the gas industry of this country does not exceed from 20 to 30 per cent. of carburetted water gas; and this does not increase in the bulk of the gas the percentage of carbon monoxide to the extent imagined by laymen who have not made calculation. Anyway, the unwritten rule of procedure keeps undertakings well within the limit laid down by the Home Office Committee; and if there is temporary excess, it is due to an unexpected access of demand through fogs, sudden trade requirement, or other emergency. There are new conditions, too, that have caused, and will continue to cause, restriction in the normal proportional use of carburetted water gas. They are the price of oil (which seems likely to remain at a figure above what it was in the past when carburetted water-gas plants were installed) and the increased production of gas per ton of coal that new methods of carbonization have made possible, and which results in the cost of coal gas into the holder being cheaper than that of carburetted water gas.

It comes to this that, in the proportion in which carburetted water gas is used, gas cannot actually be said to be more dangerous than where it is not used; and if the National Chamber of Trade are anxious to eliminate danger in daily life, they should set themselves the fantastical task of trying to eliminate those things that occasion a greater number of deaths in a twelvemonth than town gas, which only becomes dangerous when allowed by negligent people to escape from their fittings. The members of the Chamber might start on the elimination of railway trains, motor cars, and motor buses; and, if they looked into the matter, they might find ground for asking for the restriction to about 50 volts of the pressure of electricity in works, factories, and dwelling-houses. Mr. Spencer would be surprised, if he only explored the subject, to learn the number of deaths that are caused by electricity at quite ordinary voltages. But he must not expect us, if he decides to take up this suggestion, although the electricity industry is the most active rival of the gas industry, to make fools of ourselves by rendering him support in any such quixotic movement.

The Policy of Hiring-Out.

Very thorough advocacy was made at the meeting of the Eastern Counties Gas Managers' Association last Friday, by Mr. W. B. Farquhar, of Ilford, in favour of the adoption of the rental system for gas-consuming appliances for extending business. It is a knotty problem for most gas managers as to how far to go in this matter, and as to what is the best policy in all respects. Where one gas engineer would do well at supplying all kinds of appliances on hire at low rentals, another might not find it so lucrative. It depends largely upon the character of the population of the district, upon the nature of the appliances that should be let on hire at low rates, and upon the extent of the use made of

the appliances. It is a subject over which one cannot generalize, or produce a standard policy for all concerns. Mr. R. G. Shadbolt, in the discussion, asked the question as to how far one should go in this matter; but he himself can only speak with any degree of certainty from experiences in connection with his own concern in its own district. When "low rentals" are spoken of, the term, of course, means rentals that will about cover the expenses attaching to capital, installation, and maintenance costs; perhaps in cases something a little under these expenses—the difference being made up by the profit derived from the extra sale of gas through the service and meter on which capital has already been spent by the undertaking. This is the most economic form of development in gas business that there can be, and so should be, by reasonable means, encouraged to the utmost.

Our own view, from an extended observation over many undertakings, is that of Mr. Farquhar and Mr. A. E. Broadberry, that the enlargement of the hire system as much as possible is the correct thing in making for an extension of prosperity. With Mr. Farquhar, we agree that the rentals should be low; and, where the price of gas is already reasonable, we should prefer not to cut it down to the last possible penny, but rather use the money in keeping the hiring rates for appliances at a figure which will produce a response in the shape of additional business. We do not think that any injustice is done to any consumer by this policy. Low hiring rates are an incentive to the adoption of gas-consuming appliances; and the fact that there is a hiring rate attached to them will be a deterrent to people from hiring them who do not intend to make good use of them. Then, as already remarked, there is often a greater profit attaching to a gas account that is increased through existing service and meter than there is from a new service and meter from which business corresponding only to the increase in the other case is obtained. Further, the appliances let out on hire assist towards that most desirable object of levelling consumption through the day, which is another economic advantage. Again, the more the uses of gas for all heating purposes are developed, the less chance has competing electricity of entry for lighting purposes. Business has to be solidified and extended; and the question resolves itself into one of the best policy. In formulating this policy, it is wise to remember, as Mr. Farquhar puts it, that the stronger the hold that a gas undertaking has over its consumers, the more likely will be the retention of custom in the face of opposition.

Of course, all gas companies cannot expect to do what Mr. Broadberry claims to be doing at Tottenham, and that is be able to pay out of the rental of gas appliances all the interest and dividend upon capital. We do not quite know what Mr. Broadberry means by this, because, looking at the last half-year's accounts of his Company, we find that a total of £22,684 was required for dividend on capital and interest on debentures, deposits, and sundry funds and loans. The total rental for meters, stoves, fires, and fittings, and maintenance of incandescent burners of the revenue account amounted to £24,242. But on the expenditure side, we see that repair and depreciation of meters and stoves amounted to £10,908, of which £5834 appears as a depreciation deduction in capital account. Deducting the £10,908 from the £24,242, we have a balance of £13,334. Even so, this balance goes far towards meeting the £22,684 required for dividend and interest. Neither the paper nor the discussion raised the question of the free supply of gas appliances, and depending entirely for recompense upon the extra sale of gas that ensues. The replacement of capital through depreciation and the amount needed for maintenance have to be met somehow; and there again the class of appliances and the local conditions must have a voice in the determination of policy. Glasgow, by fixing cookers free, has had a large accession of day business, and finds the system pays through the permanent business not otherwise procurable. The Tottenham Company show a large accession of business by the hiring-out system at rentals that produce a profit for the undertaking, as shown by the figures already quoted. The Ilford Company also find their business extending by adopting fairly low rentals and hiring out almost all kinds of gas-consuming appliances, with a few exceptions which are to receive reconsideration. The whole question is one for deliberation by each concern; but there is no question about it the hiring-out system in an acceptable form is one to be developed by every gas undertaking. It is the practice of the most progressive and prosperous concerns.

"Injustice" to the Prepayment Consumer.

One of the strangest papers that has ever been written on the subject of the prepayment system was read at the meeting on Friday of the Eastern Counties Gas Managers' Association; and a further strange thing is that the author was Mr. John Carter, of Lincoln. Let us say frankly that we are sorry the paper in its present form has been read, and that it is our duty to publish it as being part of the proceedings of a technical Association. The reason may be at once stated. It is that, without such protest, criticism, and qualification as were made by Mr. A. E. Broadberry, Mr. R. G. Shadbolt, Mr. W. D. Child, Mr. W. W. Townsend, and others on this occasion, it would only require a few expressions of opinion from professional gas men of the kind found in the paper to lead to all sorts of complications and trouble in the parliamentary committee rooms, through the use that would be made of the opinions by hostile local authorities when companies are in Parliament—some of them companies serving areas where there is such a divergency of demand on the part of prepayment consumers that any "revision" of the terms on which they are supplied would result in much complexity, or render the prepayment business in regard to profit of such a character that injustice would be done to the ordinary consumer by either its continuance or discontinuance—the latter in view of the large amount of capital involved. When one is thinking of talking publicly about injustice to prepayment consumers, let that one make abundantly sure that his action and the rectifying of what he conceives to be a wrong will not inflict an injustice upon fellow gas engineers, their undertakings, and other people.

The statutory maxima of excess price allowed for prepayment service beyond what is charged to the ordinary consumer—the 10d. without cooker, and the 1s. with cooker—are the real points upon which Mr. Carter conceives injustice exists. The maxima are not necessarily the sums that gas authorities do charge. They have been fixed with the view of covering all sorts of conditions; and yet they do not in the case of many poor consumers with low consumptions actually meet all the charges that are incurred by the provision of a gas supply for them. In short, whether or not the maxima or any lower charges are fair depends upon what is supplied to the prepayment consumer, the quantity of gas he uses, and whether rents are charged in the case of the ordinary consumer. Mr. Carter, from his position at Lincoln, ought really to have been the last gas engineer in the whole country to have criticized what is almost universally the practice, and for more reasons than one. In the first place, he has never introduced into Lincoln the prepayment system of the several component parts of which it is usually constituted. As a matter of fact, he only supplies prepayment meters, and nothing else. And what is the result? Out of 4800 prepayment meters that he has in use, 4700 are simply replacements of ordinary meters in large part to satisfy the whims and fancies of 4700 former consumers; so that the prepayment meter, without accessories, has only captured an additional 100 consumers. Mr. Carter knows his Lincoln better than any other gas man; and he does not think there is much scope there for the prepayment system as usually installed. But is he positively sure that the omission to put the system as ordinarily developed into full force is not depriving some of the poorer homes of Lincoln of a public service which would be of inestimable advantage to them? If there are not a number of such homes in the city, then it stands isolated from all the rest of the country as being exceptionally peculiar in this particular characteristic.

In the second place, when Mr. Carter criticizes what others are doing, and thanks goodness that he is not as other gas managers in this respect, it is open to us to ask, has there not been, and is there not, injustice in his own practices? For thirty years past, he tells us, all the capital expenditure on the Lincoln undertaking has been taken from the pockets of the gas consumers; and we rather fancy that, notwithstanding this, something is also taken from their pockets in aid of the rates. The part taken as capital expenditure is a matter we do not seriously criticize, as, if consumers had not provided the money for capital purposes, they would have had to provide sinking fund and interest for the necessary loans, and would probably not have had the benefit of the present price of gas. But there are 4700 consumers—and we take it they are the smaller consumers—who have had expended on them the money required in

providing 4700 ordinary meters and in fixing them. These meters have been removed, and 4700 prepayment meters have been purchased and fixed in their stead; and 4700 ordinary meters have been thrown back (with the expenditure or value they now represent) on to the Gas Department. The expenditure involved by this change has been provided by proceeds derived from consumers generally. Is that, or is that not, an injustice to the ordinary consumers who have occasioned no such idle and no such additional expenditure? By no twist of the imagination can we see that it is not. In Lincoln no meter-rents are charged; and these prepayment meter users are only charged 2¼d. per 1000 cubic feet above the ordinary price to cover the expenditure incurred in their behalf, which is summed up in the difference in the cost of collection and the difference between the (is it the depreciated?) value of an ordinary meter and the initial value of a prepayment meter. There still remains the idle capital expenditure upon the ordinary meters, until the ordinary meters (if ever) find useful service elsewhere. That at all events is how we see an injustice, in the absence of more explicit information. Of course, Mr. Carter may say that the 2¼d. covers all that. But the old meters might have done useful service for years longer; and the new ones were purchased out of revenue supplied not only by the consumers who have changed over to prepayment meters, but by others who still continue as ordinary consumers. Further, though the average consumption through the prepayment meters is 15,000 cubic feet, that is only an average; and therefore some of the consumers contribute more than 2s. 9¾d. a year through the 2¼d. per 1000 cubic feet, while others no doubt contribute something much below the 2s. 9¾d. Between these prepayment consumers there is thus some, if slight, injustice. Before we begin to talk of injustice, there may be reasons for looking well at the position existing at home.

However, in Mr. Carter's mind, the time has come for the revision of the standard excess price, and the actual excess charged by other undertakings than the one at Lincoln. He entirely fails to see how, under any set of circumstances, 10d. or 1s. (with a cooker) per 1000 cubic feet is an excess price that can be justified. But Mr. Carter fails us by not explaining how he would set about this revision without covering the prepayment system with intricacy which it will not stand if it is to continue to be a practicable system. If we were not in the habit of talking so much about averages in connection with the prepayment system, and saying instead or in addition something about maxima and minima, a critic, even such a keen one as Mr. Carter, would pause when requested to suggest revision of the excess charge without producing complication, and without limiting the service of the prepayment system among the poorer section of every community, more especially in some of the denser populated parts of the country. In these places—and even in rural towns, as illustrated by Mr. C. G. Grimwood during the discussion—there is a big gulf between maximum and minimum prepayment consumption. How is absolute justice to be awarded these consumers without, as we say, introducing impracticability by increasing the labour demanded, without depriving the poor consumer of the primary attraction of the prepayment system that he knows what his obligations are, and without having trouble with the poorer consumers, and eventually in many cases cutting off from them the conveniences of a gas supply. The only way to produce equity is to strike a definite average figure per installation that will cover all expenses; and then return to each consumer any excess money paid above this definite figure, and recover from those whose consumption has not provided the requisite sum the necessary difference. That is the only way in which there could be any absolute justice; but we should be sorry indeed to see the prepayment system undermined in its potential service to communities by the introductions of complications of the kind. If Mr. Carter, in the quiet repose of his cathedral city, would devote himself to showing the gas industry how he would meet the difficulties of the situation, so as to enable all gas managers to avoid injustice as between prepayment consumer and prepayment consumer, without making the system unworkable and more expensive, and without lessening its service to the whole community, the gas industry would be under a greater debt of gratitude to him than it will feel on reading the paper which is now before us. Had the author first looked at the question of injustice in all its bearings, and produced a workable solution of the difficulties of the situation, his paper would have been welcomed. Mr. Carter is a politician, and therefore recognizes that he is open to criticism. Hence the freedom that we feel may be exercised in commenting upon the paper, and the freedom that readers may also exercise if they desire to make further criticism through our columns.

The Heat Purification of Gas.

A brief letter from Mr. Charles Carpenter, D.Sc., in our "Correspondence" columns to-day will be of particular interest in view of the lecture that he has engaged to deliver at the Institution meeting in Liverpool next June, and to which lecture a reference is made in the editorial columns to-day. We have known how optimistic the Chairman of the South Metropolitan Company has always been over the success of the heat system of purification; and his paper before the Société Technique last year supplied full justification for his optimism, both on the score of purification result and cost. At the time, however, Mr. Carpenter intimated that the initial installation of the plant had been rather costly; but he also indicated that those who had been working at the problems encountered in developing the system saw where economy could be effected both in installation costs and running expenses. The complete confidence in the system has in Mr. Carpenter's short letter substantial testimony in the announcement that the Company have recently put to work a plant at the East Greenwich station having a total capacity of 15 million cubic feet per day. What is also gratifying is that the anticipations of greatly lessened first cost and working expenses, compared with the figures given in the Société Technique paper, have been realized. Gas engineers will be keenly interested in these announcements, and will agree with us that the South Metropolitan Company have rendered a large service to the gas industry in this matter of the heat process of sulphur purification; for they have now demonstrated its efficiency on a working scale that cannot be criticized from the point of view of magnitude.

Calorific Value in Parliament.

The House of Lords Committee before whom is to be discussed the question of a calorific value standard and test will meet to-day; and it is expected that the Gas Light and Coke Company's Bill will be at once taken in hand. The Governor of the Company (Sir Corbet Woodall, D.Sc.) and his colleagues have realized that in this matter the interests of the gas industry for the time being are in their hands. Last Friday, there was a consultation on the subject, at which Counsel retained to support the Company's Bill were present; and this conference was the cause of the President of the Eastern Counties Gas Managers' Association (Mr. Thomas Goulden) being, much to his regret, unable to take the chair at the meeting of the members that day. But the importance of the conference was a reason for absence that the members accepted with the greatest willingness.

The "Silica" High-Pressure Lamp.

At the time that the Keith "Silica" high-pressure lamp was first seen, we were struck by the beauty of the light, and by its possibilities and economies, if certain attendant structural difficulties could be overcome. The possibilities were found particularly in the increase in lighting efficiency, and the reduction of maintenance costs. We had not the slightest fear, with the development of the lamp in the hands of that untiring and tenacious worker at high-pressure lighting problems, Mr. George Keith, that the infantile troubles associated with the fresh advance would eventually be brought under control; and it would indeed have been a great pity in the cause of high-pressure gas lighting if they had not been. In a paper read by Mr. Keith before the Southern Junior Association last Friday evening, it is found that the difficulties—which were mainly due to temperature and nozzle effects—have been so far surmounted, through persistent work, that he is very sanguine now as to the good behaviour of the lamp. On the advent of the silica cup, it was soon found that it was not merely a question of this superseding the glass globe, but it quickly presented several new problems, the solution of which promised to place high-pressure gas lighting on a higher plane than ever, so that the simultaneous advances of the chief lighting competitor could be faced with the utmost equanimity. There was, for instance, a phenomenon to which allusion may be

specially made. The first thing that a time ago struck one was that, using silica in place of glass, there would be a fairly high light absorption. But the surprise was that the efficiency of the lamps was really improved. This is easily capable of photometrical demonstration; and the reason that has been discovered is that, through the smallness of the silica cup—just a little larger in diameter than the mantle itself—the high temperature reached within the area in which the mantle is enclosed has an important effect on the incandescence of the mantle, and results in the enhanced efficiency.

Cheap Circulators and the Position of the Geyser.

In the discussion on Mr. W. B. Farquhar's paper at the meeting of the Eastern Counties Gas Managers' Association, the question of the development of the water-heating business was referred to—particularly by Mr. A. E. Broadberry. His remarks should be read by the makers of water-heating gas appliances, because manifestly he does not consider that they are doing all that they might do, through efficient and cheap construction, in helping the development of this business. What have they to say to this? We are not sure that Mr. Broadberry's strictures were altogether deserved; but evidently he purposely put them in a way that, if they met the eye of anyone concerned, the thrusts should go home. He stated that he had received a circulator of American manufacture that was cheaper than those supplied by British makers; and he suggested that home producers might go to America for a few wrinkles in the matter of efficient and cheap construction. As to the efficiency, we will wait for the test that Mr. Broadberry admits he has not yet made; but the fact that he has had this circulator sent to him is not without significance—both for British makers and gas undertakings. Another point was raised. There is no doubt that before long the water-circulator and the geyser will settle down better into their respective lines of usefulness. The gas-heated water-circulator, of course, is not a necessity in every house. In many, the geyser is amply sufficient; and for the purposes of some houses is more economical than would be the water-circulator. In a house where hot water is wanted at several points, the circulator is the correct thing; where water is only wanted at one point, the properly flue-fitted geyser is all that is needed. For single point requirement, the waste of heat in the circulating system, and the waste of gas in heating up a quantity of water that is not wanted, are things to be avoided if the water-heating business, which is not confined to circulators, is to make the largest possible headway.

THE LATE WALTHER FELD.

A Personal Appreciation.

In the "Journal" for March 24 appeared a short account of the life-work of Walther Feld, more especially the part of it which concerned the gas industry. Through the courtesy of Professor Dr. Lepsius, of Berlin-Dahlem, who has written an appreciation of his late friend for the German Technical Press, we are able to place on record a few personal details, which were not available at the time of our previous article. The following is a translation of some of the words of Dr. Lepsius.

A genial investigator, a talented chemist, an untiring, never-despairing pioneer in the province of chemical technique, an attractive, thoroughly accomplished, and ever-interesting personality of most straightforward character, has all too soon been taken away from science, industry, his many friends, and his family. Walther Feld died from the effects of appendicitis on March 15 in Linz a. Rhein, at the early age of fifty-one. He was born in Neuwied on Nov. 4, 1862, where his father was a much respected medical practitioner. At the early age of 15 his restless spirit and his independence of character drove him forth into the world. Two stormy years of fighting alone in life at this early age were not wasted for him, for, after six months' arduous studying, he passed his first examination with honours in Zurich. Feld completed his studies in Zurich, Leipzig, and Munich.

His active life, so full of toil and trouble, was not rewarded with its fair share of material success. But naught could rob him of his belief in the goals of his ambition, towards which he strove with unflinching diligence. His death, within an arm's length of the achievement of his greatest work (which was an endeavour to revolutionize the treatment of tar and ammonia products from gas manufacture) would almost justify the calling of his life a tragedy. He was destined never to enjoy the fruits of his life's work. It was with pride and joy that he inspected, only a few days before the onset of his last illness, the first large plant erected from his plans, as the result of years of work and experimenting. The crowning joy of himself setting in action this installation at the Gute-Hoffnungs-Hütte at Sterkrade, in Westphalia, which was almost complete at the time, was not to be his. In spite of this, however, he may be accounted as a happy man, in the best sense of the term. He was one of those in life who grow to realize that man's greatest happiness is the striving after ideals, and any worldly gain which he found by the way was only welcomed as a means towards the achievement of those ideals. At his death the sky was lighted by the dawn of the realization of at least one of his ideals. Happy indeed he must have been.

Feld was a decided Nature-lover, and his favourite recreation for mind and body was a walk in the open air after hard work. It was, perhaps, in the course of his ramblings that he became acquainted with the carbon dioxide springs of the Brohltal and the sulphate of baryta deposits near Hönningen, both in the neighbourhood of his birthplace. The geographical proximity one to another of these gifts of Nature was perhaps the inspiration which gave birth to the barium industry—the first commercial enterprise to which Feld turned his attention. The rest of the story was told in our previous article. Suffice it here to say that it needed a bold spirit, such as Feld undoubtedly possessed, to take up the manufacture of a product for the application of which—at any rate in bulk—a use was as yet non-existent. The flourishing state of the industry at the present day in those small towns on the Rhine shows that Feld's confidence in himself was not misplaced. The tar and ammonia industries owe a very deep debt of gratitude to the founder of the barium industry, and in the history of the development of chemical industry in Germany, nay, throughout the whole world, the life-work of Walther Feld is ineffaceably written on a page of honour.

PERSONAL.

Mr. H. M. Thornton, J.P., of the Richmond Gas-Stove and Meter Company, Limited, has been elected a member of the Institution of Mechanical Engineers.

We learn that Mr. T. Milne has, in consequence of bad health, relinquished the chairmanship of the Sulphate of Ammonia Committee, and that the new Chairman is Mr. D. Milne Watson, the General Manager of the Gas Light and Coke Company.

Mr. C. Valon Bennett, the Engineer and General Manager of the Rochester, Chatham, and Gillingham Gas Company, who is to be married to-morrow (Wednesday) to Miss M. Pitt, a niece of Mr. H. P. Maybury, the Chief Engineer to the Road Board, has been presented with a handsome silver salver by the Chairman and Directors of the Company, and also an inlaid mahogany clock by the Secretary and staff at the head office of the Company.

At the ordinary meeting of the Institution of Civil Engineers last Tuesday, the elections of one Honorary Member, four members, twelve associate members, and certain transfers of associate members to members were reported. Among others transferred to full membership were (in alphabetical order): Mr. A. E. Broadberry, of Tottenham; Mr. Thomas Goulden, the Chief Engineer of the Gas Light and Coke Company; Mr. J. N. Reeson, the Chief Engineer of the Metropolitan Gas Company, Melbourne; and Mr. Thomas Wright, of the Dowson and Mason Gas-Plant Company, of Manchester.

The Directors of the Crowborough District Gas Company have appointed Mr. Alec G. Cheal Engineer, Manager, and Secretary, in place of Mr. Irwin A. Cook. Mr. Cheal received his education at the Skinners' Public School at Tunbridge Wells; and after a year or two with his father, who is Secretary of the Edenbridge Gas Company, he was articled to Mr. S. Carpenter, the Engineer and Manager of the Dorking Gas Company. On the completion of his articles, he secured an appointment as one of the assistants to Mr. Andrew Dougall, the Engineer and General Manager of the Tunbridge Wells Gas Company; and this position he has occupied for the last seven years.

Last Tuesday, Mr. Sydney Trow Smith, the Manager of the Leek (Staffs.) Urban District Council Gas-Works, was selected out of thirty-three applicants for the position of Gas and Electricity Manager for the Malvern District Council, in succession to Mr. W. H. Johns, who is going to West Bromwich. Three candidates selected by the Committee were interviewed by the general body of members. The voting by ballot was very close. The salary attached to the position is £350, rising to £400 a year. The new Manager at Malvern is the son of the late Mr. T. Smith, of Cannock (Staffs.). He was articled to his namesake, Mr. B. W. Smith, then of Smethwick, and continued with him when he went to Walsall. He went thence to Leek in 1907.

At a meeting last Tuesday of the Board of the Scarborough Gas Company, Mr. A. Philip Allan, only son of the late Mr. Alexander Allan, was appointed Manager and Secretary in succession to his father. Mr. Philip Allan was educated at the Edinburgh Academy, and then became a pupil under his father at Scarborough for about three-and-a-half years, during which time he passed first class "Honours" in the "Gas Manufacture Examination" of the City and Guilds of London Institute. In 1908, he obtained an appointment with the North Middlesex Gas Company, and was Assistant to Mr. L. Trewby at their Mill Hill works for over four years. In 1912, Mr. Allan returned to Scarborough to take up the position of Assistant Manager and Secretary, which position he has since held until his appointment as Manager and Secretary.

THE INSTITUTION OF GAS ENGINEERS.

Meeting of the Council.

A MEETING of the Council was held last Thursday in the Board Room of University House, Leeds, on the invitation of the Pro-Chancellor (Mr. A. G. Lupton) and the Vice-Chancellor (Dr. M. E. Sadler). The PRESIDENT, Mr. Edward Allen, M.Inst.C.E., of Liverpool, occupied the chair.

In connection with the arrangements for the examination of gas-fitters, the syllabus of which has been approved by the Department of Technology of the City and Guilds of London Institute, it was decided to hold a Conference of the District Examinations Committees, appointed by the District Associations affiliated with the Institution, at Liverpool, on Wednesday afternoon, June 17.

The following names were approved for inserting in the ballot list: As candidates for membership—Mr. James Bell, of Kirkintilloch; Mr. Fred Betley, of Wigan; Mr. Donald Currie, of Airdrie; Mr. Charles H. Kay, of Douglas (I.M.); Mr. John Kelly, of Bridlington; Mr. William M. Pettigrew, of Portadown; Mr. William E. Roberts, of Wootton, Liverpool; Mr. Samuel Tagg, of Preston; and Mr. Charles V. Townsend, of Hereford. As candidates for associate membership—Mr. Harry Large, of Newport (Salop), and Mr. Eric W. Morrison, of Sheffield.

The following were transferred from the class of associate members to members of the Institution: Mr. Reginald G. Clarry, of Swansea; Mr. Ralph Halkett, of Glasgow; Mr. Wallace W. Hammond, of Bognor; and Mr. Sydney W. Ibbotson, of Newport (Isle of Wight).

The respective Presidents of the Société Technique de l'Industrie du Gaz en France and of the Deutcher Verein von Gas- und Wasserfachmannern, Professor John W. Cobb, Livesey Professor of Coal Gas and Fuel Industries at Leeds University, and Mr. H. P. Maybury, Chief Engineer to the Road Board, were nominated for election to honorary membership of the Institution.

The deceases were announced of M. Georges Visinet, Past-President of the Société Technique de l'Industrie du Gaz en France; Mr. Alexander Allan, of Scarborough; Mr. Thomas Cross, of Cannock; Mr. Edward Jones, of Burslem; Mr. Charles Meiklejohn, of Rugby; and Mr. S. S. Mellor, of Northwich. The condolence of the Institution was expressed with the sister French Society in the loss sustained; and a resolution of sympathy was passed with those who had been bereaved.

It was reported that the following had been elected as District Members of Council for the year 1914-15: Representing the Eastern Counties Gas Managers' Association, Mr. Thos. Goulden; the Manchester District Institution of Gas Engineers, Mr. Walter Whatmough; the North British Association of Gas Managers, Mr. Lawrence Hislop.

Nominations were made for the year 1914-15 of the President, Vice-President, Honorary Secretary, Ordinary Members of Council, and Auditors.

Arrangements for the Annual Meeting of the Institution at Liverpool, commencing on Tuesday, June 16, were further considered. The following programme was approved:

LIST OF COMMUNICATIONS TO BE PRESENTED.

Address by the President, Mr. Edward Allen, of Liverpool.
Annual Report of the Council.
Report of the Refractory Materials Committee, to be presented by the Honorary Secretary to the Committee, Mr. F. J. Bywater, of London.
Reports of the Institution Gas Research Fellows:—
Mr. Harold Hartley, M.Sc., on "The Electrical Condition of a Gold Surface during the Absorption of Gases, and their Catalytic Combustion," describing work carried out under the supervision of Professor W. A. Bone, F.R.S. (late Livesey Professor).
Mr. Harold Hollings, B.Sc., consisting of two communications: (*a*) "Thermal Phenomena in Carbonization;" (*b*) "Influence of Red-Hot Coke and Radiant Heat on the Gaseous Products of Carbonization," both by Mr. Hollings and Professor John W. Cobb, B.Sc. (Livesey Professor), contributed from the Department of Coal Gas and Fuel Industries of the University of Leeds.
First Report of the Ventilation Research Committee, to be presented by the Chemist to the Committee, Mr. William Harrison, of Leeds.
Lecture on "Purification by Heat: A Century's Progress and its Lessons," by Mr. Charles Carpenter, D.Sc., of London.

PAPERS.

"Some Novelties in Gas-Works Practice from Norway," by Mr. B. K. Schieldrop, of Bergen.
"Calorific Power as a Standard," by Mr. Jacques Abady, of London.
"The Application of Coke-Ovens and 'Otto' Direct Ammonia Recovery to Gas-Works Requirements," by Mr. Geo. T. Purves, of Chryston, near Glasgow, Member of the Scottish Junior Gas Association (Western District).
"The Value of Sulphate of Ammonia and Gas Lime as Fertilizers," by Mr. John West, of Southport.

A report was presented with reference to the proposed formation of a National Gas Committee, consisting of representatives of the Institution, the Society of British Gas Industries, and the British Commercial Gas Association. It was stated that, at the suggestion of the Council, a Joint Committee had been appointed, composed of delegates from the three organizations named, and that several meetings had been held for the discussion of the proposal.

In response to the request of the Society of British Gas Industries, it was arranged to receive a deputation for the purpose of considering the question of the adoption of a common method for gauging gasholder sheets.

A report was presented indicating progress which had been made with reference to the question of the official testing of gas-fires and the issue of official certificates.

Mr. Alexander Wilson, Past-President, the Institution's delegate at the International Congress on Pipe Threads, held in Paris last November, presented his report on this subject, which was accepted and adopted for inserting in the annual report of the Council.

The report of the Finance Committee was submitted and adopted. A donation to the Roads Improvement Association was included in the items of disbursement.

An invitation was accepted for the Institution to take part officially in the Sixth International Congress of Mining, Metallurgy, Engineering, and Practical Geology, to be held in London from the 12th to the 17th of July, 1915.

The proceedings terminated with a vote of thanks to the Senate of the University for the facilities extended in connection with the meeting.

A visit was subsequently paid to the Department of Coal Gas and Fuel Industries, under the guidance of the Vice-Chancellor, Professor Arthur Smithells, and Professor John W. Cobb. Great interest was evinced in all that was shown.

THE MEETING OF THE SOCIÉTÉ TECHNIQUE.

Provisional Arrangements.

As already announced in the "JOURNAL," the next congress o the Société Technique du Gaz en France will be held in Paris. It will be opened on the 17th of June, and close at midday the following Friday. The 16th was the date originally announced; but it was intimated that it might be altered. The business will be transacted in the hall of the Society of Civil Engineers, in the Rue Blanche, under the presidency of M. Auguste Boutan, the Managing-Director of the Lyons Gas Company. The morning of the first day will be devoted, as usual, to the admission of new members, the nomination of members of the Committee, and the reception of the reports of the Committee and the Treasurer. In the afternoon the distribution of medals, awards, and prizes for papers will take place, and some of the technical business proceeded with. At half-past four the members will visit the works of the Paris Gas Company at La Villette. The whole of Thursday will be given up to papers and discussions; and in the evening the banquet of the Society will be held at the Grand Hotel. The remaining business will be disposed of on Friday morning. The following subjects have been set down for discussion during the meeting: (1) "Measures to be employed to prevent deposits of naphthalene in mains." (2) "The principal causes of the destruction of cast-iron mains." (3) "Employment of small coke for the heating of gas producers." (4) "Practical data and a study of the action and applications of a generator of great gas-producing power." In connection with the congress, there will be the usual exhibition of appliances in the entrance to the building in which the meetings will be held.

At the close of the congress, those of the members who are desirous of visiting the Lyons Exhibition will be afforded an opportunity of doing so; an arrangement having been made by the Society of Civil Engineers, the International Society of Electricians, and the Société Technique for a special train, if the number of applications is sufficient, to leave the P.L.M. Terminus in Paris at 3.30 on Friday afternoon, and reach Lyons about midnight. Next morning there will be simultaneous sittings in two halls of the exhibition, in the course of which particulars will be furnished by local members in regard to the most interesting objects to be seen there and at the works to be inspected. A paper on "Electric Traction" will be read by M. Latour. In the afternoon the exhibition will be visited; and in the evening there will be a dinner to which will be invited the Mayor of the city, the principal functionaries of the exhibition, and the officials and others connected with the works which will be open to the visitors. Sunday morning will be at their disposal; but in the afternoon they will go over the new central station of the Gas Company. The morning of Monday will be devoted to a conference or to a visit to the exhibition, and the afternoon to an inspection of the works of the Société Lyonnaise des Forces Motrices du Rhône and the central station of the Société Générale de Force et Lumière, or some others. Visits will also be arranged for ladies accompanying the members. On the Tuesday there will be an excursion to Grenoble, where the day will be spent. It will be left in the evening (by special train, if possible), and Paris reached by seven or eight o'clock the following morning.

ELECTRICITY SUPPLY MEMORANDA.

The Wednesbury Sequel.

It was really too bad of Mr. W. Fennell (or the electrical papers that reported him) to have kept in the dark prospective happenings, when he read his paper recently, before the Birmingham Section of the Institution of Electrical Engineers, on the subject of the alleged brilliant success at Wednesbury in the supply of current for lighting three rooms in some 250 cottages. It seems that the services of Mr. Fennell to the Wednesbury Town Council are about to cease (he having resigned his position); and Mr. J. P. Smith, his assistant, is to succeed to the position of chief responsibility. It will be remembered by those who read our comments on Mr. Fennell's paper [see "JOURNAL," April 14, p. 94] that he calculated that, out of a revenue of £1 12s. 6d. a year from a cottager on the described system of charging, there was a profit of 15s. 6d. His employers appear to entertain grave doubts as to the material existence of this profit; and, scanning the financial statements of the department and the net losses, they cannot find the profit expressed anywhere. The Committee, supported by the Council, decline to allow this business to go on any longer on the terms that Mr. Fennell held up for the admiration of the electrical industry—terms involving a free use of three lamps, at rates commencing at 5d. per week in June and July, and varying month by month on each side of the two midsummer ones until 10d. per week is reached in December and January. The Lighting Committee have recommended, and the Council have agreed, to "switch off" at once any further extension of this cottage supply business, and to charge the cottagers at present using electricity 1s. per week from September to March and 8d. per week for the other six months —the cottagers henceforth to be also charged for renewals. We have sympathized with cottagers over the small amount of light they are allowed to enjoy under these fixed-price-for-electricity schemes. We sympathize with these Wednesbury people who, under this scheme, have changed their methods of lighting, and have now to pay an increased price, with new conditions attached. The Committee and Council have decided that free-wiring shall be discontinued, and that the supply of electricity to the stall-holders in the market shall also be discontinued from May 1. The annual revenue from the cottagers who desire to remain on the books of the undertaking, will in future be £2 3s. 4d., instead of £1 12s. 6d.; and even at the revised price, the Committee are not anxious to have any more free-wired and unrestrained electricity using cottages. The result is sure to be a gradual return to the use of gas as an illuminant and for cooking purposes on the prepayment system.

The Help-Yourself Principle.

The Committee apparently feel very sore over this cottage-lighting business. When Mr. Councillor Knowles introduced to the Council the question of the proposed changes, he said the Committee considered it necessary to forthwith discontinue the free-wiring; and in view of the position of the undertaking—losses have been its portion—they thought revision of price to the existing cottage consumers the best method to adopt. He added that "the small houses which had already been lighted used a considerable amount of current—more than was anticipated." All we can say is that it is surprising that men of business should have expected economy without measurement. Would a local butter merchant or butcher expect to do good business on a low fixed price and help-yourself principle? We can see the piles of butter and the stock of meat disappearing with a speed that would make the respective traders groan, and regret their contract. He also said that "in the best interests of the town and the undertaking," the Committee had resolved to place Mr. Smith, the Assistant Manager, in the position of Engineer and Manager. This, then, is the end of the Wednesbury 15s. 6d. "profit" per annum per cottage scheme, which appeared to be based on letting the cottagers have current at a lower cost per unit than other consumers of current for lighting. Not far from Wednesbury, we know of a case where the average receipts per annum from prepayment gas consumers amount to £1 18s. 8d., which include lights and a cooker, and the gas is measured. Compare this lighting and cooking receipt of £1 18s. 8d. with the £1 12s. 6d. and the revised sum of £2 3s. 4d. for only three electric lights and no cooking, and it is clear that a lasting success on Mr. Fennell's terms could not be expected. It is not a common-sense transaction. If cottages can be supplied on these terms, then other houses using double or treble the number of lights could be supplied at a much lower fixed price per three lights on the help-yourself principle. The experience of Wednesbury ought to be a warning to other central station engineers not to dabble in speculation of this kind, but to keep to the ordinary method of transaction in which measurement has part.

Jeering not Argument.

Not long since there was occasion to refer in these columns to the articles under the heading of the "Public Health Department" that appear in the "Sanitary Record." There is again occasion. The article is stated to be "From the Desk of a 'M.O.H.'" Desks are wooden and unintelligent things; and so this may explain much of the stupid jeering, without a trace of scientific information or argument, that constitutes the article before us. The Medical Officer of Health who claims this particular desk as a possession should keep it under proper restraint, and not permit it to make a silly of itself in the way that it does when treating of the subject of gas lighting. Professor Lewes delivered a lecture recently before the Sanitary Institute; and it was published in the "JOURNAL" for March 24. The Professor and a few lines from the lecture are the subjects of the scoffing; but there is not the slightest indication on the part of the scoffer as to where the Professor is wrong in his arguments, nor any offer to prove chemically that he is incorrect. The principal point over which the "desk" makes merry is the part of the lecture in which Professor Lewes illustrates how the heat of the incandescent burner has the effect of causing the air heated by it to rise in a room, and in doing so, draws with it the emanations of the human lungs and bodies—thus leaving the air of the room at breathing-level in a greater state of purity than would be the case where the human ejections continue to float largely at the level of their emission. Professor Lewes described as a "cesspit" the top zone of a room into which the foul air due to the occupants is carried. We admit that "cesspit" is not a nice word; the only thing about it is that it is expressive. The "desk of a M.O.H." does not like an aerially suspended cesspit above it, but evidently prefers the breathing air to be mixed with the emanations from the lungs and bodies of the occupants of a room, so that they can re-breathe the foulness, until, by some stroke of good fortune, it partially escapes *viâ* open windows or doors. We like ventilation ourselves; and with a window slightly open at the top, we find that the ventilation is assisted, and a cleaner atmosphere is maintained for breathing, where the heat of a gas-burner comes into play upon the atmosphere than where there is no such heat to cause the movement of the contaminated air upwards.

Stagnant Air.

The deficiency of the electric light in rendering aid to ventilation is particularly noticed where a number of people are assembled. "M. O. H." will perhaps explain to his unintelligent desk what "stagnant" air means. Though high-power electric-fans are used in the electrically-lighted lecture theatre of the Institution of Electrical Engineers, the electrical papers have cried out aloud about the stagnant air in the place when meetings are being held. It is not a pleasant thing for electricians to breathe and re-breathe air contaminated by the emanations of the lungs and bodies of a few hundred electricians. This is what they do at the Institution of Electrical Engineers when meetings are being held, and the air is stagnant. With a gas-ventilating lamp or two in the hall, the place would be altogether different. In another part of the same issue of the "Sanitary Record" as that in which the unintelligent desk let itself go, there is a paragraph referring to the subject of the ventilation of the House of Commons, into which a Committee are now inquiring. There have been more complaints than ever since the Chamber has been lighted electrically. Gas lighting served the Chamber during the days of the legislative giants of the last century; and there are no records of complaints of bad ventilation then. Now the "Sanitary Record" reports that, before the Committee, Lady Byles, who is a fairly constant visitor to the House, spoke of the impurity of the atmosphere in the Ladies' Gallery. "There is an insufficiency of air, and what there is is of bad quality. The air is not so bad when the gallery is not crowded, but it is never good." Sir Francis Fox, Dr. Leonard Hill (a greater man on this subject than the "M. O. H." who owns the unintelligent desk), and many others have similarly testified to the bad condition of the air in the Legislative Chamber. Several other places in which people assemble, and which are electrically lighted, have had complaints made about them in regard to the stagnant air and the sense of oppression that comes over one. This is largely due to the mixture of air and emanations which the aforesaid desk manifestly prefers for breathing purposes, and through the want of movement in the air, such as is set up by the action of a gas-burner. We prefer something of a purer nature; and it can be obtained by the assistance of the heat of a gas-burner and a little common sense. This is not denied by either "M. O. H." or his unintelligent desk.

The I.E.E. Theatre.

Only within the last few weeks, the "Electrical Review," which three years ago applauded the lighting of the theatre of the Institution of Electrical Engineers, has turned upon the lighting, and condemned it in cutting fashion previously noticed in the "Memoranda." In the correspondence that ensued, Mr. M. Farrer, of Twickenham, said "there is a deadly stagnation about the air of the theatre which is most depressing. When the attendance is at all large, the heat and closeness towards the end of the proceedings is [*sic*] very trying." About the lighting of the theatre, electricians appear to be generally sick of it. It is of the shadowless form; and the descriptions applied to it are varied. Here are some examples: "Monotonous," "dull and depressing," "novelty of the thing has worn off, and the inefficiency has been demonstrated," and "funereal and most depressing." Another correspondent seems to think that "insufficient regard was paid to the fact that not only both the light sources used have a very high 'ageing' coefficient, but that the initially high absorption of the mahogany panelling would increase materially with the passage of time." Electric lamps are not supposed

(according to electrical advertising literature) to have a "high ageing coefficient." Another correspondent has come to the conclusion that a room of any kind cannot have a cheerful appearance unless one can see patches of light—of course, without glare. We sympathize deeply with the electricians in their confession that they—supposed to be experts in illumination—have failed so lamentably to appreciate what was required for the lighting of their own central home, and for keeping the air from becoming stagnant and oppressive.

Treacherous Electricity.

There was a time when our electrical contemporaries were given to sneering at those who asserted that death could be occasioned by electricity at the ordinary voltages of supply. But their understanding of the subject was brought to a more appreciative state by a succession of happenings year after year, against which they could not contend. In factories and on lighting circuits, there have been many losses of life through contact with live wires or lamps—the voltages of the current that causes death ranging from under 100 upwards. Some time ago, reference was made in these columns to deaths that had occurred in connection with electric baths. Professor Gariel has lately read a paper before the Société de Médecine Publique et de Génie Sanitaire, in which he describes two cases of death by electrocution in baths, and which cases have come under his personal observation. In one of them, the current was derived from the electric light mains, and was conducted to the metal base of the bath. The pressure of the current was not more than 110 volts. Although some people consider such a voltage harmless, Professor Gariel points out that the contact surface was large, being represented by the entire body. Electrical communication was established in the other case by the subject catching hold, with his wet hand, of the metal chain of an electric bell, in which the current was much weaker. The Professor also noted the case of a workman engaged upon constructing a new underground railway, who was electrocuted on touching an electric lamp with moist hands while his feet were in water. Recurring cases of this kind, Professor Gariel says, are producing much uneasiness. It is not surprising. The danger is hidden and insidious; and no warning is given to the victims by smell, as is the case with escaping gas, or in any other way.

Miscellaneous Lighting Notes.

The revelations concerning the heavy expenses incurred by Hampstead in the conversion of the public lighting from gas to electricity will be well in memory; and if the actual cost could be collected from other areas, there would be some eye-opening statistics presented to the ratepayers as to the costs involved in producing (unless large metallic filament units are employed) a very indifferent system of lighting in the secondary streets. In many places, after conversion, the complaint has been made that the total light afforded in the streets has not been so great as under the pre-existing gas-lamp system, and certainly not nearly so efficient as would have been the case if the most modern system of gas lighting had been adopted, at a much lower initial capital expenditure. It is seen by a four-lined paragraph in one of the electrical papers that the Dover Town Council have decided to give a little more business to their electricity concern by spending £1600 in supplanting 257 gas-lamps by 239 electric-lamps. We have not the slightest doubt that the Corporation Electricity Department has cut down to a very fine edge all the charges possible, in order to quote a slightly lower price than the charge of the Gas Company—the price quoted by the Electricity Department was £846 per annum, as compared with the £925 paid to the Gas Company. The candle power of the electric-lamps is not stated in the paragraph; and there are to be eighteen less electric-lamps than gas-lamps. Upon the conversion, about £6 14s. per lamp is to be spent, which somebody has got to pay. This is local administration, with economy and efficiency ignored. We see that at Worthing, the Council are considering the question of superseding the flame arc lamps by the misnamed "half-watt" lamps. Also, in various parts of the country, the cinema proprietors are kicking at the charges made for energy for lighting and lantern purposes. The electricity people want to share in the prosperity of the picture palaces; and they make the fact that the greater proportion of the demand is during the ordinary lighting hours of the day, the reason why the cinema proprietors ought not to expect current at low prices. But they do expect it; and they mean to get it. One way—there are several examples in the country—that gas managers can suggest to them is to have a private generating plant, and use a gas-engine as the prime mover. By the private plant, they will save money, and secure reliability, by avoiding all the dangers of a collapse between a central generating station and the cinema building.

London Electric Supply Scheme.

There has been some discussion as to the cause for the abandonment of the London Electric Supply Bill. "The Times" stated that it was due to the hostility of the Engineers of certain of the London Electric Supply Companies, and to the dissension between the Companies. Mr. W. F. Fladgate has written to our morning contemporary to set it right. He says that as all the Companies except one were opposed to the Bill, it is obviously incorrect to say that there was dissension among them. The one, we take it, was the promoting County of London Company. Mr. Fladgate also adds that the investigations of the Companies' engineers went to show that the scheme had not the remotest possibility of financial success. Yet the scheme was based on an average revenue of 2·63d. per unit. In the report of Messrs. Merz and M'Lellan, they calculate that the present average price is only 2·35d. per unit (which is lower than the average mentioned above), and they consider this a high average charge. It is easy to see from this that the investigating engineers of the London Companies will have no difficulty in also arriving at the conclusion that the scheme of Messrs. Merz and M'Lellan will not stand the remotest chance of success. In an article in the "Daily Telegraph" on the subject of the support or otherwise the companies are likely to give to any scheme issuing from the report to the London County Council, the writer asserts that practically all the Companies serving in the west-end districts are opposed to unification; these Companies being well off, as the public in their areas "can afford to pay ridiculously high prices for electric supply for lighting." In the eastern and southern districts, the electricity companies have a different class of resident with which to deal; and there is "fierce" competition on the part of the gas suppliers. The result is that their areas are not nearly so well developed as the more wealthy west-end ones, where tall prices are paid for the electric current. If Mr. Fladgate is right, that the investigating engineers of all the London Companies could not find signs of financial success in the County of London Company's defunct Bill and scheme, then we take it the writer in the "Daily Telegraph" is a little bit at sea as to the support a scheme by the London County Council would receive at the hands of the less affluent Companies in London.

WORKS TOPICS—XXX.

By "Modus Operandi."

Disposal of Town's Refuse.

A perusal of the newly published "Municipal Year Book" brings to light the fact that at one gas-works in the United Kingdom the burning of house refuse is in daily operation. It is, of course, a matter of common knowledge that a fair amount of gas can be obtained from such refuse, as it consists to a certain extent of carbonaceous matter, with, however, a rather large moisture content. At the works of the Wellingborough Gas Company, a dust destructor has been erected to enable the Company to contract for the disposal of the house refuse collected in the town. The arrangement is presumably an advantageous one; but it may be worth while drawing attention to a process, which has for its object the gasification of this refuse in retorts in conjunction with coal.

In this process the refuse, after being shot into a hopper, is cut up to a convenient size by revolving knives placed at the bottom of the hopper. It is then dropped into a drying-box, in which the material is dried at a temperature of about 200° C. by the waste gases from the settings. Following this operation a quantity of coal, amounting to about 20 per cent., is added to the refuse in each drying-box, prior to carbonization in a retort. Each drying-box is sufficiently large to hold a complete charge.

It is found by experiment that a ton of wet household refuse, which contains on an average from 25 to 33⅓ per cent. of moisture, will yield, without admixture with coal, 1567 cubic feet of gas of 367 B.Th.U., 15 lbs. of sulphate of ammonia, and 14 cwt. of carbonized residue. In a practical trial, which was made some years ago at the Barking Gas-Works, it was ascertained that a ton of wet refuse, after drying and when mixed with 20 per cent. of coal, would yield 3483 cubic feet of gas of 483 B.Th.U., 20 lbs. of sulphate of ammonia, and 14 cwt. of carbonized residue. The calorific value of this residue was 5134 B.Th.U per lb.

This system was introduced some years ago by the Refuse Converter Company, and was described in more detail in the "Journal" for March 10, 1908, p. 621. Here it was stated that a carbonizing process for the disposal of this refuse was obviously more sanitary, and more satisfactory on economic grounds, than any system in which the material is burnt for steam-raising purposes. With refuse destructors there is the disadvantage of the nuisance caused by the emissions from the chimney shaft, and the loss of the ammonia, which is recoverable in a carbonizing process. There is, further, in the case of a gasifying system, the obvious gain in efficiency due to the fact that an internal combustion engine utilizes the heat contained in the fuel to much greater advantage than is the case with a steam-engine.

The test of this system was carried out in inclined retorts; but it is more than possible that a vertical retort would prove to be much more suitable, owing to the difficulty of charging such material into an inclined or horizontal retort. Presumably the process was not a commercial success, as, so far as the writer is aware, it has not been adopted for practical purposes. This does not prove, however, that it could not be satisfactorily developed, given a fair trial under favourable auspices.

The Filling of Furnaces.

I have to thank Mr. William Wilson, of Falkirk, for his very interesting letter in last week's "Journal," p. 189, in which he gives chapter and verse to account for the remarks contained in his recent presidential address on the question of filling the fur-

naces when working twelve-hour charges. Mr. Wilson explains that it was his rule to take one horizontal row of retorts at each draw; so that it is easy to understand the difficulty he spoke of in his address. The only alternative would be to discontinue the practice of limiting each draw to a single horizontal row of retorts, and arrange to discharge one of the four suitable retorts whenever the furnace required refilling. This may not be so convenient, but the difficulty is not one that should deter any engineer from adopting heavy charges should his retort-house machinery be suitable.

The Moisture in Gas and the Pumping of Syphons.

Mr. Wilson has assuredly given us "furiously to think" when he tells us that, owing to the introduction of an oil film on the water in the gasholders, the district syphons have become practically dry, and that syphons which had to be pumped frequently are now "blowing," owing to the drier condition of the gas. This is a matter of considerable interest and importance; and Mr. Wilson has shown the way to a more sensible realization of the absurdity of saturating our gas with moisture. This practice is quite indefensible, for the moisture is useless, and its recovery from the syphons is the cause of much expense; while frequently its condensation in badly laid pipes is a source of much annoyance to consumers. It is, further, a matter of common knowledge that dry gas does not deposit naphthalene to anything like the same extent as gas that is saturated with moisture. It is a fact that gas leaving the works will contain a very large quantity of moisture, amounting approximately to:

408	grains	of	water	vapour,	or	1·2	per	cent.,	with	gas	at	50° Fahr.
747	,,	,,	,,	,,	,,	2·2	,,	,,	,,	,,	,,	68° ,,
1311	,,	,,	,,	,,	,,	4·1	,,	,,	,,	,,	,,	86° ,,

A film of oil placed on the water in gasholders will undoubtedly prevent gas from absorbing any water. But there is an objection to its use, in that the oil will be deposited on the painted plates and give them an unsightly appearance. This is a disadvantage that cannot be disregarded, and is a point on which Mr. Wilson might care to make a few comments.

The extraction of moisture from gas has been briefly discussed in this column on a previous occasion, when the suggestion was made that the use of condensers on the outlet of the gasholders would have fairly obvious advantages in one or two respects. It is, however, doubtful whether a centrifugal hydro-extractor would not be better suited to deal with moisture in gas. In any case it is a subject which calls for attention.

The Value of Recording Instruments.

An article on the "Utility of Pressure and Vacuum Recorders" in the "Journal" last week, p. 175, gives several instances of the value of such instruments. Having fitted these recorders at a large number of points on both coal gas and carburetted water-gas plant, I can fully endorse all that is stated to their advantage in this article. It is very true that "if their value is only appraised by the extra care the workmen find it necessary to take in executing their duties where these tell-tale instruments are in operation, this alone will amply justify their use." I have lively recollections of the defects in methods that were disclosed when these recorders were first adopted on the inlet and outlet of the exhausters. It was, to give one instance, these instruments that showed plainly that at certain times the boilers primed owing to the starting of a large hydraulic pumping engine placed very close to the boiler-house. This affected the exhauster engines simultaneously, with the result that both the vacuum and back-pressure readings were for the time being "all over the shop." This was cured by the adoption of automatic feed water regulators on the boilers, by means of which the water level is maintained at a constant point, which may quite safely be lowered by a reasonable amount where this apparatus is fitted.

On scores of occasions, owing to warnings given by these recorders, it has been possible to locate defects—such as a water-logged main at some point on the works—some time before the trouble has become acute. Again, should a seal blow at night it has been usual, in many works, to "hush it up" to save someone getting into trouble for neglecting his work. A tell-tale recorder not only brings the guilty party to book, but, what is better still, it prevents the neglect of duties. There is no doubt at all that these instruments should be looked upon as an essential part of a gas-works plant.

I am particularly impressed with their value on retort-house chimney stacks for controlling main dampers, and on the outlet of gasholders for testing the working of the lifts. For the latter purpose, it is clear that no better means could be adopted of checking the working of a holder.

Calorific Standards in Various Cities.—At the meeting of the Indiana Gas Association last month, Mr. J. B. Klumpp, the Secretary of the Public Relations Committee of the American Gas Institute, submitted a paper on the "Calorific Value of Expressing the True Quality of Gas and Conditions Governing its Supply." Towards the close of his communication, he gave the following list of the average calorific standards in various cities. Its reproduction may be useful for reference: London, 500, 450; Berlin, 543, 522; Paris, 550; Nancy, 539; Rennes, 570; Chatres, 506; Valence, 506; Marseilles, 551; Milan, 573; Buenos Ayres, 570; Colombo, 400.

NOTES FROM ABROAD.

Buenos Aires Public Lighting.

The Municipality is this year making considerable additions to the public lighting of the city. When the scheme is complete, there will be 20,000 public gas-lamps in use, besides which electricity, alcohol, and petroleum are used. Most of the standards, lamps, and fittings will be ordered from England, though it is stated that tempting tenders have been received from Germany, and others from United States firms.

German Coal.

The agreements of the Westphalian Coal Syndicate terminate at the end of next year. The Syndicate, which represents an annual output of some 100,000,000 tons of coal, practically controls the Westphalian market, besides having agencies in France, Holland, Belgium, and other countries, and so has much influence in all the Continental markets. Negotiations for a renewal of the Syndicate have been in progress for two years, but little advance seems to have been made. Should no further arrangement be come to, the competition of the individual coal producers in Germany would be considerably weakened.

Advertising Coke in U.S.A.

The Grand Rapids and the Detroit City Gas Companies have for some time been enthusiastic advertisers of coke in the daily Press. Both have adopted coupon schemes. In the case of the Grand Rapids Company a coupon reduces the price to the extent of $1.50 for two tons; one ton having to be ordered by a present user of coke, and one by a new consumer. They must be presented through a dealer. The scheme is a clever one, as it is an inducement to coke users to introduce its use into their friends' households, and secure new names on the Company's books, and new customers.

Guiding Aviators by Night.

According to the "Deutsche Luftfahrer-Zeitschrift," lights for the guiding of aviators by night should not be arranged so that the strongest rays are thrown out vertically upwards, as in this case they can only be observed from quite a short distance away. The most powerful rays should be directed slightly above the horizontal, and the light should decrease in intensity towards the vertical. By this means they are made visible from much greater distances. As with lighthouses at sea, so with those intended for the help of aviators there should be some individual revolving or flashing arrangement peculiar to each, so that the aviator can easily recognize where he is.

German Monthly Gas Returns.

The German Gas Publicity Centre has published its monthly returns of gas-works results for November and December of last year. In November the results of 750 were available for comparison with 1912, and in December 777. Thus it is seen that each month an increasing number of works give their assistance in compiling these useful and interesting figures. In November the increase over the same month of 1912 was 1·5 per cent. in gas consumption, and 7·5 per cent. in meters; the increase in the number of slot-meters fixed being 30·8 per cent. For December the consumption increase was 4·2 per cent., and meters 8·3 per cent. The meter figures in each case are not given for quite so many works as are the consumption figures.

Water Gas as a Stand-By.

In the course of a paper read before one of the German district associations recently, Dr. R. Witzeck, of Cologne, speaking of towns taking supplies of coke-oven gas, made the following remarks: The delivery of water gas, stipulated by many towns in their contracts in case of strikes, is regarded by many gas engineers as a measure of rather illusionary value, as experience has proved that, when a change is made from coal gas to water gas, no appliances, whether lamps, cookers, or motors, work without serious trouble. If, on the other hand, a town considers it absolutely necessary to have water-gas apparatus within its own territory, the interest, amortization, and periodical trials of the plant which are necessary raise the cost of the coke-oven gas something like 1·7d. per 1000 cubic feet.

French Auer Gas Company's Working.

At the recent annual meeting of the French Auer Incandescent Gas Company, it was stated that the year 1913 had been characterized by a slackening of business, which had affected all the industries carried on by the Company. Although this had caused a slight diminution in the profits, a reduction in the outlay for extensions enabled a larger net profit to be realized than in 1912; the amount being 2,809,215 frs. (£112,369), against 2,743,481 frs. (£109,739). Adding the carry forward and a sum of 322,500 frs. taken from the premium capital, there was produced a total of 3,501,616 frs. (£140,065), which allowed of the payment of a dividend of 55 frs. per double share, or 110 frs., compared with 85 frs. for the year 1912. The Directors stated that the new industries which had been taken up by the Company had not diverted their attention from what had always been the foundation of the prosperity of the concern—viz., lighting by gas; and in the past year improved appliances had been devised, notably for use with high-pressure gas, which now occupied an important place in the public thoroughfares of Paris.

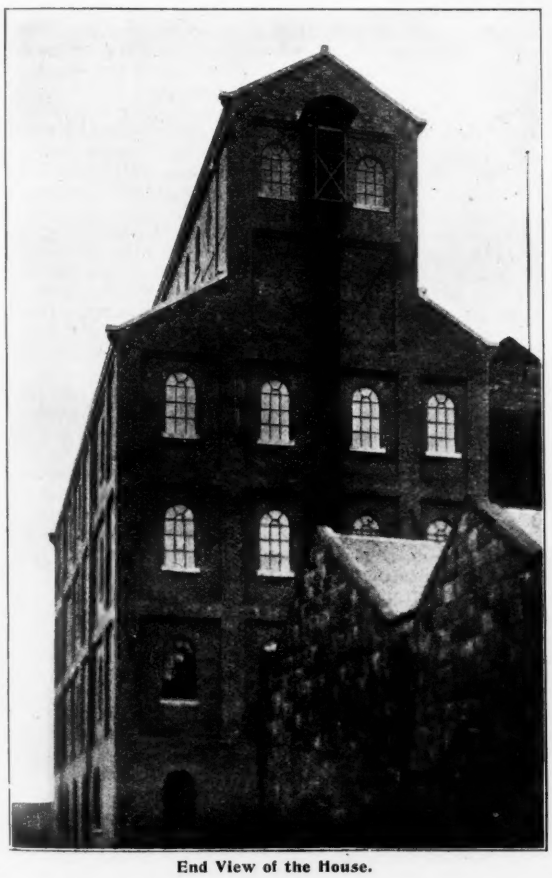
VERTICAL RETORTS AT ABERDEEN GAS-WORKS.

A Woodall-Duckham Installation.

THE annual inspection of the Aberdeen Gas-Works (which took place last Wednesday) was rendered specially interesting on this occasion, because, in the presence of the members of the Town Council, the new vertical retort installation was inaugurated. The party were conducted through the various departments by the Convener of the Gas Committee (Mr. J. A. Sangster), the Gas Engineer (Mr. Samuel Milne), and the Assistant Gas Engineer Mr. C. E. Smith), who explained in detail the various operations.

The installation is on the Woodall-Duckham continuous system, and consists of five settings, each containing four retorts, or twenty retorts in all, with a productive capacity of about 1¼ million cubic feet of gas per 24 hours. The retorts are housed in a building about 80 feet in height, which is a light but well braced steel structure, filled in with a screen of 4½-inch brickwork, with 9-inch pilasters. There is ample provision for light. The roof principals are of steel, and the framework of the retort-bench setting is utilized to give the necessary support to the roof, which is covered with slates. The chimney-stack is 120 feet high, and is of sufficient size to deal with double the present carbonizing plant. For inspecting and attending to various parts of the plant, there are ample facilities in the way of staircases, platforms, and ladders.

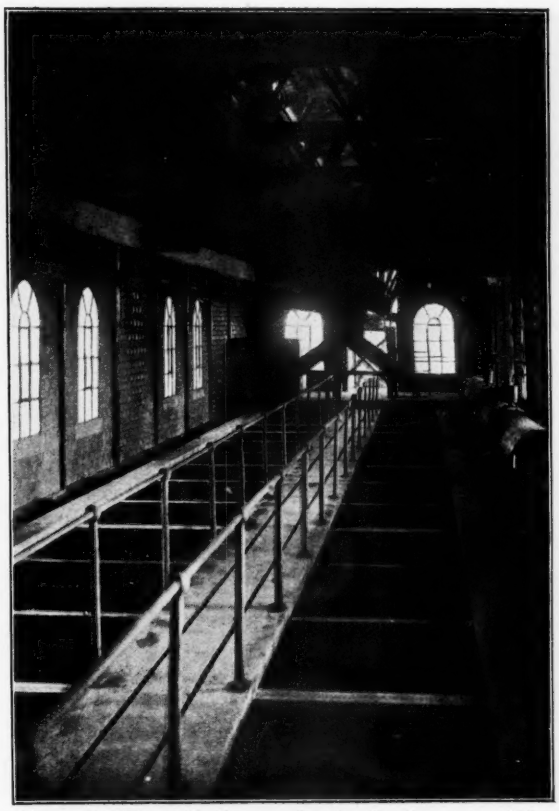
As the coal-waggons arrive at the works, they are upended by hydraulic tippers; the large coal passing through a breaker, and



End View of the House.

the small coal through a grid to a hopper. By means of a push-plate conveyor and a gravity bucket conveyor (encircling the retort-setting), the coals are elevated and tipped into the overhead bunkers, the capacity of which is equal to about 48-hours' requirements. The gravity bucket conveyor also carries up a proportion of the coke produced to the overhead coke-bunkers, from which supplies are drawn to maintain the fuel-bed in the generators. From the overhead bunkers the coal passes through a circular gas-tight valve to the auxiliary coal-hoppers at the top of the retorts. The coke can be discharged from the retorts, as required, into the gravity bucket conveyor or into tipping-waggons, and thence conveyed to the coke-yard. The gravity bucket conveyor is driven by an 8-H.P. totally enclosed electric motor, and the coke-extractor gear by a 4-H.P. gas-engine; while a 10-H.P. gas-engine acts as a stand-by to both the electric motor and the extractor engine. The coal-breaker and push-plate conveyor are also steam-driven; but there is a stand-by 10-H.P. gas-engine for the conveyor.

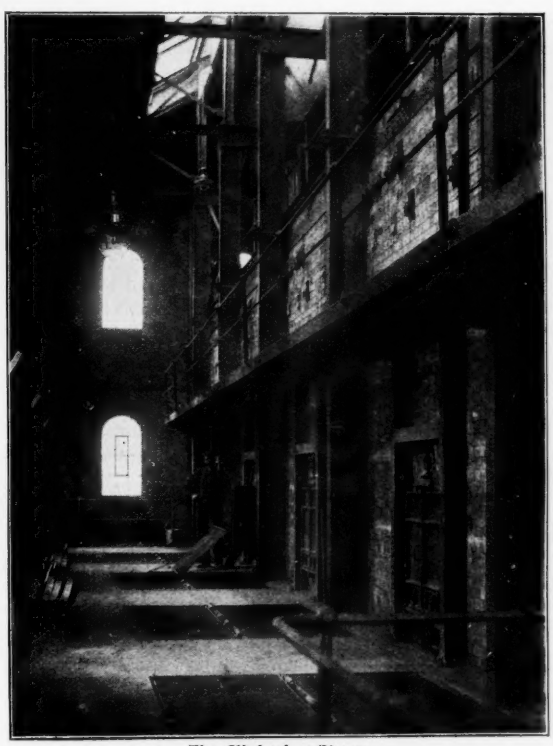
The contract for the retortbench complete, including all steel work, firebrick work, chimney-stack, and power plant, was given to the Woodall-Duckham Vertical Retort and Oven Construction



View on the Top of the Hoppers—Showing the Conveyor and the Foul Main.

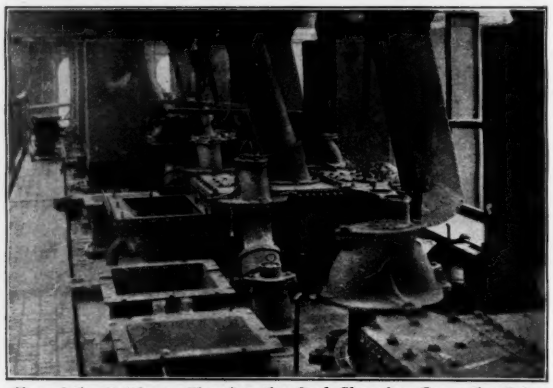
Company, Limited, of Westminster. The coal-breaker, push-plate conveyor, hoppers, hydraulic plant, and coke-shoot were supplied and erected by Messrs. Barry, Henry, and Co., Limited, of Aberdeen. Local contractors were engaged in connection with the building; and the foundations throughout, as well as the coal-breaker pits and concrete floors, were carried out by workmen of the Gas Department.

After the inspection luncheon was provided—Bailie Young being in the chair, in the absence of the Lord Provost. Mr. Sangster, in reply to the toast of "The Gas Committee and its Convener," gave a number of interesting details of the undertaking generally, and said the plant just installed was capable of producing gas only of 17-candle power, as against 18 to 20 candles with the horizontal retorts. At first sight, this might appear a retrograde step; but on account of the almost universal use of incan-



The Clinkering Stage.

descent burners it was not now necessary to supply gas of high illuminating standard, while for heating and cooking it was satisfactory to note that the calorific value was not depreciated in the same proportion. The Convener added that the new plant would bring up the capacity of the works to 5 million cubic feet per day, giving a margin of 20 per cent. over the present maximum demand. They had also had to add to their condensing, scrubbing, and washing apparatus, and had recently accepted the offer of Messrs. W. C. Holmes and Co., of Huddersfield, for a plant capable of dealing with 4 million cubic feet of gas per day. Mr. Sangster proposed "The Contractors," and spoke of the excellence



Top of the Settings—Showing the Coal-Charging Gear, the Coke Shoots to the Producers, the Gas Offtakes, &c.

of the work done. He mentioned that Aberdeen was the first city in Scotland to adopt the Woodall-Duckham system; and it was to their credit that since then such towns as Greenock, Dundee, Hamilton, Irvine, and Air had followed suit. In the course of his reply on behalf of the Woodall-Duckham Company, Mr. Cloudsley thanked Mr. Milne for the assistance he had given the firm, and presented Mr. Sangster with a handsome silver tray as a memento of the occasion. In proposing his health, and that of the other officials of the Gas Department, Bailie Young spoke of Mr. Milne as an ideal Manager, and pointed out that, owing to his excellent services, the work had been carried out without the aid of any outside expert.

THE USE AND THE ABUSE OF THE COMMERCIAL SECTION.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

Those managers of gas-works who have joined, and otherwise supported, the Commercial Section now attached to nearly all the District Associations, may probably have observed that the same has been in operation for a sufficient time to enable them to form some idea of the extent to which the objects sought by the promoters have actually been obtained in practice, and as to benefits that have accrued collectively to the industry as a whole, and individually to the single members.

The advantages of the monthly conferences are practically confined to those within easy distance of the meeting centre. In these days of associating, it would be interesting to know (1) how many notices of meetings the average gas manager receives in the course of a year, and (2) the percentage of meetings actually attended. Is it out of the way to say that the number of notices is about forty, and that the number of attendances, on account of increasing duties and departments at home, is about four? An afternoon off once a month is not an impossibility; but when attendance involves a whole day, and possibly a long day's absence from home, anything like a regular attendance at the monthly conference is out of the question. An occasional visit is all that can be managed. The small number of such meetings that I have been able to attend conveys the impression that this is a misfortune, and that the monthly meeting, with its informal discussions, is the most useful privilege pertaining to membership of the Commercial Section. Especially is this the case with regard to any pressing local perplexity or difficulty.

To many (perhaps the majority of) members, the only benefit is the annual report, and the fortnightly or monthly price list, which is principally confined to residuals. The practical value of these lists is in direct proportion to the accuracy and completeness of the returns, because an incomplete return may be misleading, and therefore worse than none at all. So it is important that those who have the welfare of the Commercial Sections at heart, and believe in retaining them, should consider not only how to make the list as complete and informative as possible in its present form, but to extend it to include similar particulars as regards purchases of coal, and other leading lines in the expenditure. Some information about latest contract prices, and the trend of the markets, might be given. No committee or council can carry this matter to a successful issue without the full co-operation of each individual member; and one who furnishes partial or incomplete returns fails to take a fair view of the responsibilities of membership. What would be the use of the list if the majority of the members acted in a similar manner? The returns should also include, if not the whole of the gas-works in the district, at least a sufficient proportion to be fairly representative.

The object of circulating statements of stocks, prices, &c., for the use of members only, being presumably both for collective and individual benefit, it may be suggested that individual members should avoid anything not complying with the first-named condition, when tempted with the prospect of some temporary advantage to themselves. Gas companies are not here to-day and gone to-morrow, but have a permanent existence—prophecies of electricians notwithstanding. Therefore the chief object should be the establishment and maintenance of permanent benefits, rather than an immediate but short-lived advantage. It may be interesting information to know the yard price of coke at a large gas-works forty or fifty miles distant, but it is more important to be acquainted with the price at which it is offered to your own customers in your own district. If anything is missing from the returns, this is usually the point left out; and it bears no relation to the yard price. A member having a surplus stock of coke can take the private list, look over all the stocks and prices within a convenient radius, locate the places where stocks are low and prices high, and, with the aid of a local directory, can send circulars to all probable dealers or users of coke who are open to take truck loads in the district, offering terms that will secure an order by underselling the local company. In this way, he benefits himself temporarily at the expense not only of the party immediately concerned, but of the trade as a whole, because competition of this sort can only be met by corresponding reductions that may, and probably will, become more or less permanent, and thus the position is weakened all the way round. So it is possible that a gas-works having already a first-class sale may find membership a disadvantage rather than an assistance, and that the general tendency will be a levelling-down, rather than a levelling-up. This question of how to deal with the surplus should be plainly and boldly faced by the Committee. Possibly some sort of co-operation could be arranged for the disposal of surplus coke in certain districts where there is room for it, without at the same time prejudicing local sales or prices.

The London Gas Companies recognized the folly of competition in gas supply and cutting prices one against the other (perhaps three or four in one street) more than sixty years ago. They made districting arrangements, under which each concern kept to its own pitch; and this practice has been generally adopted throughout the country. It would be difficult at this time of day to find two gas undertakings bidding for custom one against the other in the same street; and, considering the number of instances where one district adjoins or interlaces the other, there are very few instances of disagreement on the score of free competition. The point has not been recognized as regards coke; and the short-sighted policy of dumping surplus coke anywhere at a take-it-away price is still frequently practised, to the general detriment of the trade as a whole. Sometimes it appears to be regarded as a legitimate means of bolstering-up the home price. There is also a custom in regard to distance, probably first of all established with a view to the protection of home prices (at the expense of outsiders), that takes the form of an increased discount according to the distance from the producing centre at which the coke is dumped, or assistance in the matter of carriage. The merchant undertaking to drop the coke outside a radius of (say) twenty miles gets better terms than (say) one who only takes it ten. The practice of selling large parcels to local merchants is objectionable, as allowing other parties to obtain control of the trade, rendering it possible not only for outsiders to be undersold, but for the producer to be undersold with his own material. There is nothing in the way of assisting ultimate disposal that could not be as easily done by the producer as by the merchants. And the merchant is an irresponsible party, outside the influence of the District Commercial Association.

There are differences as regards the production of coke and of gas, seeing that one is produced in accordance with the demand, and the other is not controllable in this manner. Therefore an occasional overlap, or treading on a neighbour's toes, may be unavoidable. A large user may be soliciting quotations from every gas-works within twenty miles, without revealing the ultimate destination; and a man, having barely room to swing a cat in the coke yard, could not be expected to pass any inquiry. But something should be done in the way of regulating the habitual and deliberate exploiting of outside districts. Possibly the man with the clear coke yard could and would be glad to co-operate for the disposal of some of the surplus in his own district on terms that would not prejudice his home prices. The British Commercial Gas Association have been giving attention to the sale of coke, and could possibly assist anyone troubled with a surplus to do better for himself, and better for the trade at large, than to dump it at a distance on terms that yield a net return of 50 per cent. or less on the home yard price.

Colonel Evan H. Llewellyn, a Director of the Bristol Water-Works Company, who died in February last, left unsettled property valued at £25,360 gross and £9642 net.

SOMERVILLE'S PROCESS FOR THE ESTIMATION OF SULPHUR IN SPENT OXIDE BY COMBUSTION.

MR. C. WINTHROPE SOMERVILLE, of the Bankside Works of the South Metropolitan Gas Company, has introduced a new process for the estimation of sulphur in spent oxide, which is a great advance on the old carbon bisulphide method, as we feel sure readers will agree after a perusal of the following description, which has been prepared [from notes supplied by Mr. Somerville. The manufacture of the apparatus—which, it may be mentioned, was on view at the recent National Gas Exhibition at Shepherd's Bush—has been entrusted to Messrs. Townson and Mercer.

The estimation of sulphur in spent purifying material is such a large and important item in gas-works laboratory practice that it seems strange so few efforts have been made to obtain a satisfactory method of carrying it out. At the present time, the carbon bisulphide process is almost universally employed. This consists essentially of the dissolution of the free sulphur in the spent oxide by treatment with carbon bisulphide. The oxide is enclosed in a glass tube, on the top of, or inside, some filtering medium; and the carbon bisulphide is allowed to drain through it into a flask, from which it is subsequently evaporated, leaving the sulphur behind.

There are various kinds of apparatus in use for the purpose, from a simple test tube, with a constricted open end at the bottom, to the more elaborate Soxhlet syphoning fat extractor, which is automatic in its action of repeatedly washing the oxide with the reagent. There are, however, very many drawbacks to the carbon bisulphide process, among which the following may be enumerated: (1) Time; (2) difficulty of getting perfectly clean sulphur on evaporation; (3) difference in results of repeat tests on the same sample; (4) inflammable nature of the reagent; (5) the fact that only the free sulphur is recorded.

The fitting up of a Soxhlet apparatus, if not permanently fixed for daily use, takes a considerable time. This, added to the actual process of washing out the sulphur, will occupy not less than one hour, apart from the evaporation of the bulk of the carbon bisulphide from the flask into the stock bottle. Then we have the final evaporation of the last traces of the carbon bisulphide from the sulphur in the flask by means of the water-oven—an operation extending over at least four hours, preferably six. So that, in a matter of time, although the operator need not confine his attention to the process throughout its entire working, a very large demand is made upon the laboratory day; and where the knowledge of the condition of recently discharged purifying material is required at short notice, the process is not found to be very useful.

The difficulty of securing perfectly pure sulphur, free from contamination by minute particles of oxide carried through the filter with the carbon bisulphide, is not a small one; and it has been found necessary to take some elaborate precautions to obviate this. The oxide was washed into a filter paper cone made from a hard paper, and a plug of cotton wool placed in the top of the cone; the cone itself resting on a secondary filter of cotton wool rammed on to the bottom of the Soxhlet tube. This was found to be effective where ordinary filter thimbles were unsatisfactory. It is a serious drawback that the total sulphur available for sulphuric acid manufacture is not recorded by the process, as such information on the quality of spent oxide and the amount of residual sulphur in the burnt oxide is eminently desirable.

Consideration of the above points lead Mr. Somerville to regard the carbon bisulphide process as unsatisfactory, and investigations were made in other directions to design a better one. Such processes as the direct conversion of the sulphur into sulphuric acid by oxidation with nitric acid and potassium chlorate, potassium hydrate, and hydrogen peroxide, and similar reagents for the purpose, were not completely successful. The possibility of converting the sulphur into sulphur dioxide by combustion and absorbing the products for estimation, either gravimetrically or volumetrically, was tried, and eventually adopted as being the only method which satisfactorily fulfilled what Mr. Somerville considers should be the three pre-eminent qualities of any laboratory process—*i.e.*, accuracy, rapidity, and simplicity.

The process consists in igniting the oxide in a stream of oxygen and absorbing the products in an alkaline solution containing a known weight of the alkali. By this means the sulphur dioxide from a known weight of oxide is converted to a sulphite of the alkali used, and a portion, or the whole, of the solution is oxidized to sulphate by the addition of hydrogen peroxide. Thus the solution containing the sulphate may be estimated either gravimetrically as barium sulphate, or volumetrically by titration with an acid of corresponding strength. Using sodium hydrate for absorbing the sulphur dioxide, the following reactions occur:

1.—Ignition. $S + O_2 = SO_2$
2.—Absorption. $SO_2 + 2NaHO = Na_2SO_3H_2O$
3.—Oxidation. $Na_2SO_3 + O = Na_2SO_4$.

The volumetric method of estimating the amount of sulphate produced is to be preferred; and for this purpose methyl orange must be used to indicate the solution, as it is obvious that some of the sodium hydrate will be converted to carbonate by the CO_2 generated in the combustion of the organic matter in the oxide. In brief, the procedure for estimating the sulphur is as follows: The oxide is contained in a porcelain crucible placed in a suitable glass vessel—the design of which is of some importance—containing inlet and outlet tubes for the passage of the oxygen.

The vessel is connected by its inlet to an oxygen generator or bottle, and by the outlet to a gas washing bottle containing a measured volume of standard sodium hydrate. The stream of oxygen is started, and the oxide ignited. Combustion being maintained, the products are carried into the gas washing bottle, where the SO_2 is absorbed. When combustion is complete, and the absorption of all products insured, the contents of the bottle are made up to a known volume. A portion of this is treated with sufficient neutral H_2O_2, indicated with methyl orange, and titrated with standard HCl or H_2SO_4. From the volume of H_2SO_4 thus obtained, a simple calculation gives the equivalent weight of sulphur and its percentage in the oxide.

The process was designed in 1907, and has been exclusively adopted since, owing to its many advantages over any other. Some favourable features are as follows:

1.—Rapidity. From the weighing of the sample to calculation of the result should not occupy more than from 20 to 25 minutes, a part of which time the attention of the operator may be diverted to other work if desired.

2.—Accuracy. Repeat tests on the same pulverized sample can be relied upon to come within 0·5 per cent. of each other; thus proving always the complete combustion of the sulphur.

[The gravimetric and volumetric estimations will coincide within a decimal point or two of each other. A comparison with the carbon bisulphide process shows 0·3 to 1 per cent. higher yield of sulphur by combustion. This is to be expected, owing to the presence of combined sulphur; the amount varying with the condition of the charge.]

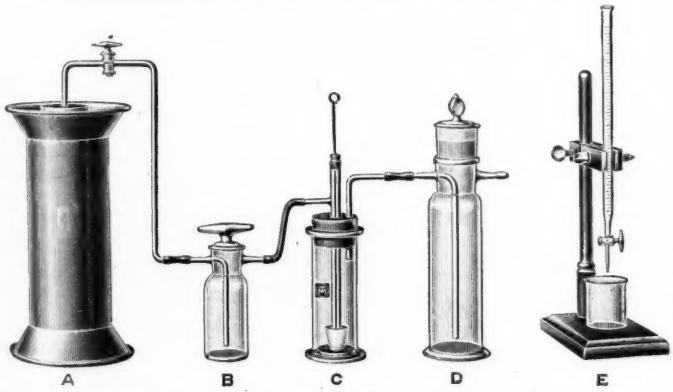
3.—Simplicity. The manipulation of the test is sufficiently simple to be within the scope of the "workman" tester—that useful institution now to be found in both large and small works. It is quite independent of the personal element for its accuracy. This is a very useful feature, for, however valuable the personal equation may sometimes be in research work, it is desirable to keep routine work as mechanical as possible within reason.

4.—Practically any quality of oxide may be successfully tested—it may contain as little as 1 per cent. of sulphur, whether revivified or unrevivified, and as much as 20 per cent. of moisture. Thus the rapidity with which the condition of oxide just discharged from a purifier may be known is very useful.

5.—Not the least important advantage is the fact that the process is similar to that in burning oxide for sulphuric acid manufacture, in which case the total sulphur available for the purpose is indicated; and this is eminently desirable. Also the residual sulphur in the burnt oxide may be estimated.

Minor advantages—such as the absence of the odour of carbon bisulphide and its inflammability—are of some value in the laboratory work and to the staff.

As regards the cost, there are only the standard solutions and the oxygen to be considered. The oxygen may be conveniently supplied from a cylinder. For cases where these are not easily obtainable, however, the author has designed a simple automatic generator for use with sodium peroxide or similar reagent for generating oxygen by contact with water. This generator is "fool-proof," and perfectly safe in use.



A, Generator. B, Gas washing bottle. C, Combustion vessel.
D, Absorption bottle. E, Burette.

The apparatus required for the complete test is shown in the accompanying illustration. It is supplied by Messrs. Townson and Mercer, who furnish full instructions for working. The burette shown is scaled to give the percentage of sulphur in the oxide direct at the end of titration; so that no calculation is required.

Just one precaution is necessary in carrying out the test. The manufacturers of hydrogen peroxide add a little phosphoric acid to it to increase the stability; so that it is generally sent out in a very slightly acid condition. Therefore, the small volume used for oxidizing a portion of the test solution has to be previously rendered neutral with sodium hydrate.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at Lowestoft.

The members of the Association met last Friday and Saturday at Lowestoft, and were favoured with excellent weather, and hospitality on the part of the Chairman and Directors of the Lowestoft Gas and Water Company. The Manager of the Company—Mr. J. Hawksley—was particularly solicitous to make the visit a success, and to him largely were due the several kindnesses experienced by the members during their visit, which, for several of them, extended over the week-end. There was one great regret, and this was that, owing to a conference on Friday in connection with the contest that is to take place this week in the Parliamentary Committee Rooms over the calorific standard and test, the President (Mr. Thomas Goulden, the Chief Engineer of the Gas Light and Coke Company) was unable to be present. The Vice-President (Mr. W. B. Farquhar), however, was an efficient substitute.

The members met at the Royal Hotel on Friday, and inaugurated the meeting by lunching together. Thereafter they proceeded to the Town Hall, the Council Chamber of which had kindly been placed at their disposal by His Worship the Mayor (Mr. J. G. Brooke).

Welcome to the Town.

The Mayor honoured the Association by his presence in the chair at the opening of the proceedings. The members having assembled, he said that, on behalf of the Town Council, he gave them a cordial welcome to Lowestoft, and was very pleased to be able to place at the disposal of the Association the Council Chamber for their meeting. He wished the members a pleasant conference, and trusted that it would prove highly successful.

The Vice-President (Mr. Farquhar) said the members could not allow his Worship to leave without according him a hearty vote of thanks for his kind reception, and for placing the Council Chamber at the disposal of the members. He would ask them to pass the vote by acclamation.

This was heartily done.

The Mayor, in his acknowledgment, said the vote was really unnecessary. He only wished that he could have done more to contribute to the success of the meeting.

Minutes Confirmed.

The Hon. Secretary (Mr. Joseph Davis, of Gravesend) read the minutes of the fiftieth general meeting, held at the National Gas Exhibition last October; and on the motion of Mr. J. H. Troughton (of Newmarket), seconded by Mr. E. W. Smith (Chelmsford), they were confirmed.

The Lighting of Labour Exchanges.

The Hon. Secretary said there was one matter arising out of the minutes on which perhaps he ought to make an explanation. It was a matter that had been before the members for the last eighteen months, and had reference to the lighting of Labour Exchanges. After the last meeting, he received a letter from the Secretary of the Institution (Mr. Walter T. Dunn) to say that the result of the inquiries made by the Council was that they had received a statement to the effect that no order whatever had emanated from the Board that the Labour Exchanges should only be lighted by electricity.

Letters of Regret.

The Hon. Secretary also referred to the letters of regret he had received. One was from the President, explaining the cause of his absence, as already alluded to. Another was from Mr. J. T. Jolliffe, of Ipswich; and there were several more from other members.

Election of New Members and Associates.

The following gentlemen were elected members of the Association: Mr. J. F. Davis, Assistant Engineer, Gravesend; Mr. W. E. Jolliffe, Engineer of Harwich; Mr. Edward Peters, Gas Manager, Wells-next-the-Sea; Mr. G. W. Richmond, of Leighton Buzzard, and of the Engineering Staff of the Gaslight and Coke Company; Mr. R. S. Tobey, Gas Engineer of Horley; and Mr. W. W. Townsend, Engineer of Colchester. The following gentlemen were elected as Associate-Members: Mr. Arthur L. Griffith, Secretary of the Attleborough Gas Company, and Secretary of the Society of British Gas Industries; and Mr. E. J. Davison, of the firm of Messrs. Davison and Partner, of Queen Anne's Gate.

Report of the Committee.

The Hon. Secretary presented the annual report of the Committee. It sketched the proceedings of the year; and among the information was the following: "The year commenced with a membership of 126. The Committee much regret the loss by death of five members—viz., Mr. C. W. Grimwood, a Past-President of the Association, Mr. A. Graham, of Mansfield, Mr. F. C. Sudgen, of Leeds, Mr. J. A. Drake, of Halifax, and Mr. T. Greaves, of Melton Mowbray. Messrs. J. N. Reeson, S. Shadbolt, and T. N. Ritson have resigned; and four other members have dropped out automatically under Rule 19. The total membership at the end of the year was 134. The accounts show a balance in the hands of the Treasurer of £20 9s. 4d. The amount received for subscriptions was £72 9s.; and the expenditure £59 7s. 7d. The balance brought forward from last year was £7 7s. 11d. The Commercial Sections have had several meetings during the year. The Committee would impress upon the members the importance of the work carried out by the Sections."

Moved by Mr. J. H. Troughton (Newmarket), and seconded by Mr. G. Baines (Harwich), the report was adopted.

Papers and Discussions.

Two papers were read and discussed. The first was by the Vice-President (Mr. W. B. Farquhar, of Ilford), on "Present-Day Requirements for Gas Consumers," and the other was by Mr. John Carter, of Lincoln, on "The Treatment of Prepayment Consumers." The papers, with a report of the discussions, appear on other pages.

On the motion of Mr. Shadbolt, a hearty vote of thanks was accorded for the authors of the papers.

Mr. Farquhar, in responding, said he was in a peculiar position. Besides presiding, he had had the pleasure of reading one of the papers; and he was grateful to the members for their recognition of his effort.

Election of Office-Bearers.

Mr. B. Young (Manningtree) proposed the election of Mr. W. B. Farquhar as President for the coming year. The members had had experience of him in the chair that day, and had known him for a number of years. He felt confident that Mr. Farquhar would make an ideal President; and it gave him pleasure to propose his election.

The motion was seconded by Mr. A. L. Clarke (Maldon) and carried unanimously.

Mr. Farquhar having thanked the members for the confidence placed in him,

Mr. John Carter proposed that Mr A. E. Broadberry be elected Vice-President. The members, he said, had had experience of "Metropolitans;" and in proposing another "Metropolitan," he was positively sure that the third "Metropolitan" would carry out his duties as faithfully as his predecessors.

Mr. W. D. Child, in seconding the motion, said he considered they were fortunate in being able to nominate for the Vice-Presidency a gentleman of such experience.

The motion having been unanimously carried,

Mr. Broadberry returned thanks. He said he was indebted to the members for the honour in electing him as Vice-President. He would do his best to carry out the duties of the office; and if in time he should reach the high office of President, they could rely on his doing everything possible to uphold the prestige of the Association. He was sorry in one respect that he was another "Metropolitan;" but, notwithstanding, he would do his best to uphold the dignity of the position.

The Chairman next proposed that Mr. Joseph Davis be re-elected Hon. Secretary and Treasurer.

Mr. J. H. Troughton, in seconding, said it gave him pleasure, for he recognized that the Association never had a better officer. Mr. Davis carried out his duties most ably; and, what was more, he had a very able Assistant-Secretary in his son.

The motion was carried with acclamation.

Mr. Davis, in responding, said it was time he had an able assistant, who industriously helped him with the work and in other matters. If the members could stand the racket, he could, and he would be pleased to, take on the work for another year.

On the motion of Mr. Joseph Davis, seconded by Mr. Carter, Messrs. W. Beale and W. Brown were re-elected Auditors.

On the motion of Mr. J. Hawksley (Lowestoft), seconded by Mr. E. W. Smith (Chelmsford), Messrs. Wimhurst and Young were elected to the vacant places on the Committee.

The Next Meeting.

Mr. Farquhar said he would be very pleased if the members would select Ilford for their next meeting. No programme had yet been drawn up; but he would be pleased if they would accept the invitation.

Mr. Shadbolt voiced the feelings of the members that they

would all be delighted to visit Ilford, to see the President in his surroundings.

Votes of Thanks.

Mr. Carter next moved a vote of thanks to the President (Mr. T. Goulden), the Committee, and the various officers of the Association for their services.

Mr. Broadberry seconded the motion, which was heartily passed.

Mr. Farquhar (speaking as the Vice-President for the year) said he could not find sufficient words with which to thank the members, in the name of the President, the Committee, and officers, for their kindness. They were all extremely obliged for the vote. Unfortunately the President was not with them; but, as he had explained, it was only important business that had kept him away. He (Mr. Farquhar) would, however, convey to him the thanks accorded by the members.

The Hon. Secretary moved a hearty vote of thanks to the Mayor of Lowestoft for kindly placing the Council Chamber at the disposal of the Association. It was one of the best rooms they had had for many a day. They had also to thank Mr. Hawksley for the interest and trouble he had taken in connection with the meeting.

Mr. Farquhar seconded the proposition, which was heartily agreed to.

Mr. J. Hawksley, who was loudly cheered, said he was indebted to the members; but he assured them that the Secretary had done most of the work, and it was so easy to help such a man as he. However, when he approached the Mayor regarding the use of the Council Chamber, his application was at once granted. The Mayor was not only pleased to be there that afternoon, but he was happy to think the members had visited the town.

Dinner and Toasts.

The members dined together in the evening at the Royal Hotel. Mr. Farquhar was in the chair, and was supported by Mr. C. S. Orde (Chairman of the Lowestoft Water and Gas Company), Mr. J. Hawksley, Mr. L. Orde, Mr. G. Moore, Mr. J. L. Peto, and others. During dinner a capital programme of musical items was rendered by Mr. W. J. Wightman's orchestra.

Mr. C. S. Orde proposed "Success to the Eastern Counties Gas Managers' Association." He said he felt that an Association of this character did an immense amount of good. Not only did they meet to read papers and discuss matters of importance to the gas industry, but there was the social side, which was highly important. They were accused of talking of "shop" at such functions. What could be better? A friendly talk over "shop" was what they wanted; for it was the one subject they knew best. The Association existed for the advancement of all matters connected with gas engineering; and he considered that nothing could be more helpful than meeting for the discussion of the subjects that they had in common. He noticed that at the sitting that afternoon they discussed "slots." As the head of a banking firm in the neighbouring town, he knew something about "slots." When the coppers came in sometimes it was a perfect nightmare. [Laughter.]

Mr. Farquhar, in responding, thanked Mr. Orde, and said the uses of the Association were most helpful to the members. The Association had continued to increase in membership from its commencement. He was delighted to see among the new proposals for membership so many of the younger gas managers; and this clearly proved that they were infusing young and new blood into the organization. It certainly was doing a useful work. They had also the Commercial Sections, at which they discussed the prices of materials, and were able to obtain information as to the state of the markets—a fact which was helpful to them as managers, and particularly so when the markets were against them in one direction or the other.

Mr. John Carter proposed "The Town and Trade of Lowestoft;" and, in the course of a humorous speech, he said he learned that the town had had its ups and downs, rows of empty houses at one time, and loss of gas-rental. But thanks to three years' successful fishing, he understood the town was now prospering, which he was sure all present wished might continue.

Mr. Lancelot Orde (a Director of the Lowestoft Water and Gas Company) said he was really taking the place of the Mayor, who had another engagement. They considered themselves somewhat up-to-date in Lowestoft. They had trams and electric light, though to talk about electricity would hardly be tactical in the circumstances. Still he only wished to convey that the Town Council desired to cater for the prosperity of the town. Having referred to the fishing industry, the speaker went on to say that it was perfectly true Lowestoft had had empty houses, but he believed that they had largely filled, and would continue to fill up. As to the gas and water supply of the town, there was no doubt about the value of those two articles as supplied by the local Company, of which he was the youngest Director.

Mr. J. H. Troughton (Newmarket) proposed "Kindred Associations."

Mr. A. E. Broadberry (Tottenham) and Mr. Charles Clare (London) replied. Mr. Broadberry, as a member of the Southern District Association, said that he and all the other members very carefully watched the proceedings of the Eastern Counties Gas Managers' Association, and took a genuine interest in its good work.

Mr. R. G. Shadbolt (Grantham) proposed "The President, and the Chairman of the Day (Mr. Farquhar)." It was unfortunate that the President (Mr. Goulden) was unavoidably prevented from being with them on this occasion. He was detained in London on very important business, and possibly was doing better work for the Association and the gas industry generally than if he had been with them at Lowestoft. He was sure the President had the best interests of the Association at heart, and would leave no stone unturned to make the meetings successful and profitable.

Mr. Farquhar replied on behalf of the President and himself (as Chairman that day). With regard to his own year of office, he said he hoped sincerely it would be useful to the members generally.

The Chairman proposed "The Secretary and Committee," and Mr. Joseph Davis replied in an amusing speech.

Visit to Lound Water-Works.

On Saturday morning the members of the Association, at the invitation of the Directors of the Lowestoft Water and Gas Company, paid a visit to the Company's water-works at Lound. The weather was delightfully fine; and the party, numbering about sixty, proceeded from the Royal Hotel *viâ* Hopton. They were met at Lound by Mr. C. S. Orde, the Chairman of the Lowestoft Water and Gas Company, other members of the directorate, and Mr. J. Hawksley (General Manager). They paid a visit to the reservoirs, and subsequently inspected the works, Mr. J. Hawksley explaining the various features. [A description of the works follows this report.]

Luncheon was served in a marquee. Mr. C. S. Orde presided, being supported by the Deputy-Mayor of Lowestoft (Mr. F. T. Dewing), Mr. W. B. Farquhar, Mr. J. Hawksley, Rev. K. Ormesby, Mr. L. J. Peto, Mr. Lancelot Orde, Mr. J. Boggis, Mr. C. G. Taylor, Dr. Gibson, Mr. R. G. Shadbolt, Mr. J. Davis, and others.

The toast of "The King" having been honoured,

The Chairman proposed "The Visitors." Twenty-five years ago he said the Eastern Counties Gas Managers' Association was founded; and twenty-five years before that he was born. Those were two interesting events. [Laughter.] He hoped the Association would so grow and flourish that it would live for centuries after he was gone. [Applause.] It was gratifying to the Directors of the Company to think that they were entertaining the members of that Association, and not only did they hope that they would come again, but that they would bring their ladies with them. The Company would be only too pleased to entertain all on such an important occasion. The Association, he hoped, would continue to grow and increase its usefulness. That the Company which he represented attached great importance to the Association was shown in the fact that on that occasion he was supported by all his co-directors, with the exception of one who was unfortunately kept away through illness. They extended to the members a hearty welcome, and hoped they would find pleasure in the visit to the Lound works.

Mr. F. T. Dewing (Deputy-Mayor), in his response, apologized for the absence of the Mayor, who, he said, was detained at business. Although he represented a go-ahead town, and the Council owned the electricity supply, the gas and water works were not the possessions of the Corporation, although some seemed to think they should be. He could not say that he was anxious they should be, for he found that the officials of the Company were always willing to do what they could for the benefit of the public. He had been associated with the sanitary authority of the town, and knew from experience that Lowestoft had a water of high standard in quality; and if at any time any suggestion had been made in regard to the supply, the Company had been only too willing to carry it out. There was always a splendid supply—in fact a year or two back when they had such a dry summer, not the slightest anxiety was caused as to the supply of water to the borough. In conclusion, he congratulated the Chairman of the Company upon celebrating the 28th anniversary of his wedding, and hoped he and his wife would live to celebrate their golden wedding.

Mr. Farquhar, in also responding, said the members were delighted to have had the opportunity of visiting these interesting works, and were indebted to the Directors of the Company for their hospitality.

Mr. Shadbolt also replied, and said not only did the members represent the Eastern Counties Gas Managers' Association, but they were welded to the Manchester District Institution, to the North of England Association, to the Irish Association, and above all to the Institution of Gas Engineers, and, on the commercial side, to the British Commercial Gas Association. On behalf of all, he thanked their hosts.

Mr. Farquhar proposed in eulogistic terms "Success to the Lowestoft Water and Gas Company."

The Chairman briefly responded. The Directors, he said, were trustees, and, as such, deeply felt their responsibility. In the past, they had overcome many difficulties, and in the future they would aim at keeping Lowestoft to the forefront, in regard to both the water and gas supplies.

Mr. Shadbolt said, if he was not intruding, he should like to express on behalf of those present their indebtedness to Mr. Hawksley. They felt that it was due to the thorough efforts that he had put forward that their visit had been the success it had. Mr. Hawksley was one of the most unobtrusive members of the Association. It had taken a number of years on the part of the members to find his true value. He had served them well in connection with the Committee; and he (Mr. Shadbolt) was sure he was echoing the opinion of all when he said that Mr. Hawksley was one of the most valued of their members. He desired to express the hope that the day would not be long before they would be sitting under his rule as President of the Association.

The toast having been accorded musical honours,

Mr. Hawksley said it had been a pleasure to him to do what he could to make the visit of the Association a success. When it was mentioned to him that the Association were coming to Lowestoft, he approached his Directors, who told him that he was to do as he pleased to make them comfortable. So he was determined that if they did come to Lowestoft, he would do all he could to make them as comfortable as possible.

THE LOUND WORKS OF THE LOWESTOFT WATER AND GAS COMPANY.

When the Lowestoft Water and Gas Company was established in 1853 the town's water was supplied from wells in the gravel formations at North Lowestoft and Kirkley, on the north and

south sides of the present harbour. The demand increasing, and difficulties arising with the wells, the Company obtained powers in 1857 to take water from a small lake in the Hopton Valley, in the parish of Lound. A pumping-station and filter-beds were first of all erected; and these were the beginning of the present Lound works.

The district of supply has gradually increased. It now includes twelve parishes, in addition to those of Lowestoft and Kirkley. To meet the growing demands for water, the Company have from to time increased the size of the works, building new engine-houses, filter-beds, and storage reservoirs, and has purchased an extensive protective area of land, which surrounds the sources of supply, protecting the springs and reservoirs from any outside influence which could prove undesirable.

The source of the supply is from springs in the deep layers of sand of which the Hopton Valley is formed—an ideal source, furnishing as it does a primary sand filtration by natural means before the springs give out their store.

Storage reservoirs have been excavated to receive the spring water in the sand of the valley. These have a capacity equal to fifty or sixty days' supply. The water is of excellent quality; and in a recent report Dr. John C. Thresh, the well-known expert, observed: "I do not think there is a town in England supplied with a safer or more wholesome water."

The works to-day consist of an engine-house containing two horizontal engines by Messrs. Marshall, Sons, and Co., Limited, of Gainsborough, of 50 N.H.P. and 40 N.H.P. respectively, with vertical pumps attached, capable of supplying to the district 1¼ million gallons and more than 1½ million gallons per twenty-four hours respectively. Two direct-acting steam centrifugal pumps by Messrs. W. H. Allen, Son, and Co., Limited, of Bedford, are used for lifting the lake water over the filters. In the boiler-house there are two Lancashire boilers. Seven filters, having an area of over 40,000 square feet, are in use. Three pumping mains, 10-inch, 12-inch, and 15-inch, convey the water to various parts of the district and to a covered service reservoir at Church Farm, Lowestoft, which has a capacity of over a million gallons. At North Lowestoft there is a high-level station, where pumps actuated by gas-engines lift the water over a stand-pipe to increase the pressure in the higher districts.

The works have been erected to the designs of Messrs. T. & C. Hawksley, of Westminster.

Under an Act of Parliament obtained in 1907, the Great Yarmouth Water-Works Company and the Lowestoft Water and Gas Company jointly obtained powers to supplement their existing supplies by taking water from the River Bure in the parish of Horning. A station is being erected at this place (28 miles from Lowestoft), from which water will be pumped to the Yarmouth Company's Ormesby works, where large sedimentation reservoirs are in course of construction to hold 20 million gallons. After sedimentation and filtration, the water will be delivered through the existing mains to the Yarmouth Company's district; the Lowestoft Company taking its proportion in bulk at the boundary of its own district of supply at Gorleston. This water will be pumped forward to the Lowestoft district by the existing plant at Lound.

Quantity of water pumped for the year ended Dec. 25, 1913	301,902,405 gallons
Highest week's consumption, Nov. 1, 1913	7,370,000 ,,
Lowest week's consumption, March 22, 1913	4,570,500 ,,
Average daily quantity consumed for all purposes	827,000 ,,
Average daily supply per head of the population	20·04 ,,
Average rainfall	24 inches

HIGH-PRESSURE GAS LIGHTING AND THE NEW SILICA LAMP.

By GEORGE KEITH, of the James Keith and Blackman Company, Limited.

[Abstract of a Paper read before the London and Southern District Junior Gas Association, April 24.]

I have been asked to read a paper on recent developments in high-pressure gas; and I propose to confine myself to a description of a new type of lamp upon which we have been working for nearly three years, with varying success. This has come to be known as the "Silica" lamp, and is the outcome of an extended experience with high-pressure gas-lamps and apparatus, dating, I think it may be safely stated, from the earliest days of intensified incandescent gas lighting.

The idea of this lamp was originally prompted by a desire to overcome some of the maintenance difficulties, which such an experience has shown to be almost inseparable from the usual types of high-pressure gas-lamps. These are mainly due to the destructive effects of the inevitable high temperatures inside the lamp on the appearance of all the parts that are exposed to the products of combustion, and which, consequently, necessitate a good deal of cleaning and renewing of these parts to keep the lamps up to the mark—more especially as regards appearance. So long as only ordinary globes were used, such troubles seemed to be unavoidable; but the introduction of the comparatively new product fused silica or quartz opened up new possibilities of improvement in this direction.

A satisfactory practical application, however, has only been attained after a very long series of experiments, and the overcoming of numerous difficulties. These, at times, have appeared to be almost insurmountable; but the present result, I think, justifies the work that has been put into it. Not only has the original object been attained, but other advantages have shown themselves, which I hope to make apparent to-night. At the same time, it must be pointed out that, as in almost all such departures from accepted principles, there are differences in procedure which at first may appear to be troublesome, but which will only require a little time for the user to become accustomed to. My own feeling in the matter is a very optimistic one as regards its future possibilities. At the present moment, the introduction of the "half-watt" lamp is causing quite a flutter both in electric and gas circles (although it has yet to prove its claims as regards efficiency and useful life); and I think it may be safely said that this new gas-lamp should be an effective weapon in the hands of the gas industry to enable it to easily compete both as regards running cost and appearance.

Fused silica, as you are doubtless aware, is a highly refractory material, capable of withstanding sudden changes of temperature without breaking (mainly owing to it having a very low co-efficient of expansion). In the lamp you see burning, though the globe is red hot, it is quite unaffected by cold water sprayed on it.

In the first place, at the time the experiments were begun, silica articles of sufficient transparency had not been made of any appreciable size, or on a commercial basis; but I would like to place on record the willingness and enterprise of the manufacturers in co-operating with us as soon as they saw the possibilities of its use for this purpose. Making allowance for the difficulties in working the material, they have now attained a high state of perfection in regard to form and transparency; while at the same time the cost, although still relatively high, has been brought within commercial limits. When it is mentioned that the temperature at which the articles are shaped is about 3500° Fahr., and that the temperature required for the subsequent glazing is about 3700° Fahr., the practical difficulties will be appreciated. Even at the best, the material of which the present globe or cup is formed absorbs an appreciable amount of light; and in order to compensate for this loss, means had to be devised to avoid a lowering of the efficiency previously attained in high-pressure gas-lamps.

I need not enter into all the different schemes and experiments which ensued; but it is sufficient to say that the solution was found in making the globe as small as conditions would permit, and so confining the flame in this small space, and incidentally excluding all secondary air. The concentrated heating effect on the mantle thus obtained not only compensates for the loss of light by absorption of the silica, but gives a substantial increase in efficiency over and above, and several other advantages to which I shall refer later.

This concentration of heat, however, while giving the desired effect on the mantle, introduced some very serious practical difficulties; the chief of them being that of keeping the temperature of the burner nozzle within practical working limits, so as to prevent the pre-ignition of the mixture of gas and air. This mixture is, of course, in a very explosive condition, not only containing the proper amount of air required for complete combustion, but being, in addition, heated to a very high temperature. The principles employed in our ordinary high-pressure lamps had to be extended and improved upon; but even with all such expedients, the temperature of the nozzle is considerably greater than in the ordinary high-pressure lamp fitted with large globe, owing to the opening in the globe or cup concentrating the products of combustion on it and its immediate surroundings.

The next, and most important point of all, was the question of the material to make the burner nozzle of; and as the principle before referred to requires it to be of good thermal conductivity, we have been confined to the use of metal. A large number of experiments have been made to test all likely metals and their alloys that were at all commercially practicable; and the greatest difficulty has been experienced in obtaining the correct material to withstand the severe conditions to which the nozzle is subjected. Several materials have been tried, which at first gave promising results, but which, in course of time, broke down and caused trouble through excessive oxidation. We are now using a material which, while it does not fulfill all our ideals, gives quite good, practical results, although we are still continuing research in this direction, and at the present moment are testing some alloys which look very promising. Tests of this nature naturally take a great amount of time; and it is mainly due to this cause that the considerable and unexpected delay has arisen in placing this lamp on the market.

I may say that the installation of lamps we had at the recent National Gas Exhibition, which was the first public demonstration of them, required a considerable amount of extra attention, owing to the failure of the material of which the nozzles were made. I specially wish to refer to the difficulty we had there as an illustration of the troubles and disappointments we have had on this

nozzle question, and to endeavour to dispel any apprehension that may have arisen due to the obviously excessive maintenance required on these particular lamps. At that time we believed we had obtained a very satisfactory alloy for the nozzles, which the makers claimed could be consistently reproduced according to the samples; and as this seemed to be the end of our difficulties, we went ahead and produced the lamps for the exhibition in good faith. We found, however, that, while the samples had behaved in a satisfactory manner, the makers were unable to reproduce the results with any certainty. A great deal of valuable time was lost in trying to get back to the original results; and apparently its behaviour was so erratic that it had to be given up entirely, and a fresh start made. I am pleased to say that we appear to have overcome this difficulty, and that the nozzles now supplied will stand the conditions, and give no discoloration of the globe through oxidation or sublimation.

When the above difficulties were satisfactorily overcome, it was found, upon putting the lamp out on the market under everyday conditions, and working with gases of varying composition, that we were not at the end of our troubles; and the next problem which arose with some gases, and under certain conditions, was a tendency for the contents of the heater and mixing-tube to explode on the turning-out of the lamp, and so destroy the mantle. After many methods for preventing the flame passing back into the heater, and so igniting the explosive contents, had been tried with varying success, the difficulty was overcome by enriching the mixture in the heater beyond the explosive range at the moment of extinction. While this is a comparatively simple operation to carry out when the lamp is controlled by its own cock, it is quite a different matter to accomplish when the lamps are controlled by means of automatic lighters working either directly off the main or controlled by means of a special control-cock at a distance. This problem has, however, been satisfactorily solved.

When once the feasibility of dispensing with a large globe, and substituting a small silica cup, had been demonstrated, the way was left open for a complete revolution in the design of the lantern. In the ordinary lantern, either high pressure or low pressure, where a large glass globe is used, the dimensions of this have to be taken as the basis on which the lines of the lamp are evolved; and, in addition to this, when the lamp is intended for outside conditions, the use of a glass globe necessitates a reflector largely for the purpose of protecting it as much as possible, when hot, from the effect of heavy rain.

In the case of the silica globe, this limitation no longer exists; and, therefore, greater scope in the production of a more pleasing form than is usually possible in a gas-lamp is permitted. Owing to the fact that no provision has to be made for allowing surplus chimney area, a further reduction in the bulk has been rendered possible. These points are of particular importance in the case of lamps used for the purpose of lighting shop fronts, for which the suspension lamp has been primarily designed.

Apart from appearance, the particular advantage of using the silica globe is that the cost of maintenance ought to be considerably reduced. This is mainly due to the fact that the ordinary cleaning necessitated by the action of dust, rain, fog, &c., on the globe is entirely dispensed with, as owing to the high temperature at which the globe is kept when the lamp is burning all the dirt due to these causes is burnt off. As this fact enables the intervals between periods of cleaning to be greatly increased, the risk of breakage of the mantle due to the opening and handling of the lamp when cleaning is naturally very much reduced. It is also found that the presence of quite a considerable hole in the mantle does not necessitate its immediate removal, nor does it greatly reduce the light. It is, in fact, quite possible to obtain a good light with the bottom right out of the mantle; or, even should the mantle drop away entirely from the top, there is still a fair light given owing to the fact that the mantle is retained in close proximity to the flame. In mentioning this fact, however, I do not wish to convey the idea that mantles should be allowed to remain in such a condition for an unlimited time.

These features will be appreciated by anyone who has had experience with the ordinary high-pressure lamps in such circumstances. The globe may become dirty in course of time, due to the gradual deposit on the inside of any slight impurities which may be present in the gas. But this effect has been reduced to the minimum by means of a special purifying apparatus, which forms an important feature in the lamp. The globe may also be dirtied inside by imperfect combustion of the gas due to bad adjustment, or to metallic oxides from the burner, &c.; but a little care will avoid such accidents.

Although the standard type of suspension lamp is not ordinarily fitted with a reflector, special reflectors may be attached to suit any particular purpose. And here, again, the smallness of the silica cup allows greater scope in the style of reflector which may be used. In the ordinary way, however, the very good diffusion produced by the slightly opalescent character of the silica globe minimizes the necessity for a reflector; and for the same reason the light, while brilliant, is not so trying to the eye as the unprotected high-pressure mantle. An additional advantage obtained by dispensing with the reflector is that the design of the lamp allows a certain amount of light in an upward direction, which is specially desirable for shop facia lighting.

Where this effect is not desired, reflectors may be fitted with advantage, as can be seen from the examples shown. It will be noticed that in all cases where reflectors are applied they are very efficient, owing to their closeness to the source of light; and as the law of inverse squares applies in this case, the reason will be appreciated. The reflecting surface does not deteriorate, as it is not exposed to the products of combustion or to the extreme heat inside, as is the case where reflectors are brought close to the source of light in the usual type of high-pressure lamp; and the smallness of the silica globe or cup does away with the usual limitations inseparable from a large globe.

The Bye-Pass.

After the lamp was first put on the market, an unexpected difficulty arose in connection with the pilot light, owing to its liability to be extinguished. In the original design of lamp, particular attention was given to this point; and it was expected that owing to its position, and to the fact that there were no openings provided for secondary air, it would be almost impossible for it to be blown out. Unfortunately, however, experience showed that any draughts that did get in had an intensified effect, possibly due to the smallness of the space inside the lamp, which, in the particularly windy winter we have had, caused frequent extinction of the pilot, with consequent trouble and exasperation.

As a consequence, we temporarily withdrew the lamp, until an improvement could be effected in this respect. I am glad to say this has now been accomplished, and the pilot-light is not only very safe so far as blowing out is concerned, but a considerable improvement has been effected in the arrangements for igniting the gas inside the mantle without explosion and consequent strain on the mantle. It is also possible to use a much smaller pilot-light than formerly, with consequent economy.

Special consideration has been given to the facilities for adjusting the burning mixture in the lamp; and in this respect a new principle has been adopted which offers considerable advantages over the usual method of adjusting the quality of the mixture by merely throttling the amount of air, in that it more satisfactorily compensates for variations in the quality of the gas, and is, in consequence, more flexible in its adjustability to suit the gas supplies in different localities, without requiring such a variety of nipples as is necessary with the ordinary method of adjusting the air supply.

The adjusting screw is also arranged to be nearly vertical; so that it can be readily adjusted from the ground by means of a cleft stick, instead of necessitating a ladder for the purpose. Yet another special feature is the facility with which the nipple can be removed for cleaning and adjusting the size when necessary. The small cap seen projecting from the side has simply to be unscrewed, when the nipple-holder may be removed.

Maintenance and Adjustment.

A few of those present may have had a little experience with the earlier patterns of these silica lamps, and will appreciate the importance of some of the changes in construction described. I would like to take this opportunity of thanking some of your members for the patience they have exercised over the initial difficulties experienced with the earlier lamps of this type. As a consequence, some very excellent results have been obtained; and I would specially refer to two important installations of shop lighting at Lea Bridge, which are a credit to all concerned. There are several other cases I might mention up and down the country, where similar personal care has been exercised, and trouble taken to master the initial difficulties, so that, in spite of the drawbacks of the earlier lamps, they are now giving very satisfactory results. There is little doubt in my own mind that, as most of these difficulties are now removed, the need for such patience has disappeared. Still, the difference in procedure as compared with the maintenance of ordinary high-pressure lamps will require a little organizing and instruction of the maintenance staff who will have the care of such lamps; and a little personal trouble taken in this direction will be well repaid.

In the first place, the question of arrangements for the cleaning of the silica cups, when necessary, must be dealt with. The cleaning of globes (say) twice a week—as is necessary with the ordinary type of high-pressure lamp, to keep them in a high state of efficiency—is not required in the case of silica cups. As a consequence, the number of visits per lamp may be greatly reduced. This in itself should tend to greater economy in mantle consumption, as it is reasonable to suppose that many mantles get broken during cleaning operations.

It is somewhat early to give any data as to the cost of maintenance; but it is confidently expected that this should not be more than about one-half the present cost of maintaining outside high-pressure lamps. Cases have been known where the silica cups have not been cleaned for six or even eight weeks without serious discoloration; but I do not think it wise to allow them to go so long, as any deposit that does form in the inside is apt to combine with the surface of the silica if subjected to continuous heating, and, though removable, is not so easy to clean as when regularly dealt with.

The method of cleaning is to use ordinary commercial hydrochloric acid (spirits of salt), and to about half-fill the cup with this and swill it round, and, after emptying it out, rinse with clean water. The acid may be used repeatedly until exhausted. Should the discoloration not come off with cold acid, it can generally be removed by heating the acid in the cup itself over a bunsen flame, for which suitable wire tongs should be provided.

Should the cups through any reason become so discoloured that these methods do not completely clean them, there are other ways which are dealt with more fully in our instruction booklet. No globe need be considered hopeless while it is whole, and at

the worst can be thoroughly cleaned and reglazed at a small cost. The best course, where a number of lamps are in use, is to have a few spare globes to exchange in the lamps, and bring the dirty ones back to the depôt, where suitable arrangements are provided. Special boxes for carrying a number of cups should be provided, as they should not on any account be nested into each other, or they may jam and break. It should be appreciated that, while these cups will not break by heat or cold, they are no stronger mechanically than ordinary glass; and as they are comparatively expensive, every possible care should be taken to avoid breakage in handling.

The Mantles Used.

The method of forming the mantles is practically the same as in our ordinary high-pressure lamps, and need not be dealt with in this paper. It might be mentioned, however, for the benefit of those who have had experience with the earlier design of this lamp, that the new enriching device has facilitated this operation; and it does not require such care to prevent splitting the mantle on first lighting-up.

The Gas and Air Mixture.

The adjustment of the mixture of gas and air should receive even more careful attention than in the usual type of high-pressure lamp, more especially in the direction of seeing that there is no deficiency of air. It is better to err on the side of excess of air than deficiency, as, in the latter case, owing to the absence of all secondary air in the cup, complete combustion will not take place there, with a consequent tendency to discolour the the cup unduly, besides lowering the efficiency. It is therefore of the first importance to see that the lamp is capable of taking in a substantial excess of air when the supplementary gas supply is shut off by the regulating screw. If this is not the case, the nipple should be reduced in bore until such excess of air is noticeable. Wherever the cups consistently get a dull grey deposit inside, deficiency of air may be suspected; and the results will be unsatisfactory and frequent cleaning necessary.

[The author explained the construction of the lamp in detail with the aid of a number of lantern slides; and he also made his points clear to the very large audience—there were about 200 members and visitors present—by means of lighted specimen lamps which were exhibited in the room.]

DISCUSSION.

At the conclusion of the reading of the paper, many points were further elucidated in the course of a conversational discussion; the questions put by the audience proving their interest in the new lamp.

Mr. J. Hewett (who presided) remarked that Mr. Keith had brought to their notice a lamp which was the result of an enormous amount of research work. The brain power which must have been put into the designing of it must have been very great. There were a number of points which could not fail to be brought home to one when listening to such a paper. Reference had been made to the presence of iron carbonyl in the gas, which resulted in a red deposit on the inside of the globe. This was not, perhaps, found in all gases; but he had himself discovered that it could be present. Mr. Keith had contributed to the welfare of the gas industry in a large number of ways. His research work—especially in the lighting department and the compression of gas—was well known to all of them.

Mr. D. J. Winslow inquired whether the author had taken the spectrum of the light rays from the new silica lamp as compared with the old pattern lamps and the white electric arc. This, he thought, was an interesting point. If the bye-pass went out, being inside the mantle how did the man light it again? Had Mr. Keith any idea as to whether the bye-pass burning directly under the nozzle affected the gauze in the nozzle owing to condensation inside the nozzle, in the same way as occurred in the case of the ordinary inverted burner when the bye-pass was placed directly underneath? They had heard about the difficulties that had to be contended against. There were gases of various specific gravities, and gases which required different amounts of air for their combustion. Then there were the various illuminating powers. Mr. Keith had radically departed from the old fashioned style of lamp. In one shop at Lea Bridge, his Company had secured an order solely because the new type of lamp was offered.

Mr. Keith replied that he had really not gone into the question of the spectrum; but he believed that there was no very material difference between the spectrum of this lamp and the ordinary high-pressure lamp. The bye-pass could be re-lighted without removing the mantle. As a matter of fact, however, he had tested the bye-pass with a high-pressure fan; and it seemed impossible to blow it out since it had been placed inside the mantle. The gauzes were well up in the nozzle, and away from the source of light; and any condensation that took place they found in the globe.

Mr. W. V. Palmer inquired as to the gas consumption of the new lamp.

Mr. Keith answered that it was about the same as with the old high-pressure lamp, but giving a higher efficiency—say, 17 cubic feet per hour for the 1000-candle size, and 25 feet for the 1500-candle. Of course, it varied.

Mr. W. J. Liberty said he thought he had the first Keith light that was made in the City of London in 1900; and he had followed the system all the way through. They were all deeply indebted to the author for coming and explaining the lamp. With regard to intrinsic brilliancy, it was, of course, known by those who came in contact with high-pressure and high-power lamps that they were "up against" the question of glare. Though they wanted to light shop-fronts, facias, and public streets, they did not want to be blinded. What was the visual effect of the new lamp as compared with the ordinary glass lamp; and was high intrinsic brilliancy less diffusive with the silica than with glass?

Mr. Keith said the lamp was certainly not so trying to the eyes as the naked mantle and the clear globe. Silica could be obtained as clear as glass; but it cost a great deal more, and the effect on the eyes was not nearly so pleasing. One of the beauties of the material selected was that it gave a softening effect to the light, and while increasing the area of the source of the light it ought to improve the diffusive quality, as compared with the naked mantle. Special reflectors had been designed to hide the light from the passer-by without greatly obstructing the shop-window. The effect of them was extremely good.

Mr. F. Ainsworth remarked that he also had followed high-pressure lighting from the very commencement. The Keith and Blackman Company came along just at the right time. In the Ilford district, it saved them from losing the whole of their parade lighting. Had the firm been able to bring the lamps down to a lower pressure? It would, he thought, be possible to do better with them if they could work at a somewhat less pressure.

Mr. Keith said great attention had been given to the question of pressure; but they had not yet got down so far as they would like. With some gases it was possible to work quite comfortably at 54 inches, while other very rich gases required a much higher pressure. As to maintenance, it was reasonable to suppose that the less frequent opening of the lamp would be an advantage from the mantle point of view.

Mr. Winslow, in proposing a hearty vote of thanks to the author, said the gas industry and other industries were much indebted to the firm of Keith and Blackman; and the inventive faculty of the firm was Mr. George Keith. The special forms of reflectors designed had greatly impressed him. They seemed to be giving a greater duty in the shop-windows than the old parabolic reflectors.

Mr. L. F. Tooth seconded, and expressed the hope that the silica lamp would not only maintain the present position of the gas industry, but give it a further impetus. Their thanks were due to Mr. Keith for the hard work he had put into so excellent an article as he had just described.

Mr. Keith's acknowledgment concluded the meeting.

Mr. Hewett, at the opening of the proceedings, said the circumstance which was responsible for him occupying the chair was a very sad one. It would be a sorrow to them to learn that their respected President (Mr. S. A. Carpenter, of Mill Hill) had been called upon within the last few days to sustain one of the greatest losses a man could suffer—the loss of his helpmeet. His wife had passed away. It would be only fitting that they should show their sympathy with him; and he would ask them to do so by rising silently in their places.

Institution of Water Engineers.—The annual summer meeting of the Institution will be held on the 11th, 12th, and 13th of June, at Stockport.

Children's Welfare Exhibition.—When making brief reference, in last week's "Journal," to the United Gas Companies' exhibit at Olympia, it was stated that there were being shown a number of fires—"the latest designs of leading makers." No attempt was made to "catalogue" the exhibits; but in walking round, it was noticed that the fires included samples made by Davis, Fletcher, Russell, and Co., Hands, Main, Parkinson, Richmond, and Wright. There may also have been others. Altogether the display was a thoroughly representative one; and among the large number of well-selected goods shown, the Richmond Gas Stove and Meter Company, Limited, ask us to state, were the following articles of their make: The "Renaissance" gas-fire, the "Bungalow" gas-cooker on stand, the "Clyde" griller on stand, the "Louis" gas-fire, the "Adam" gas-fire, and the "Surrey" condensing stove.

Street Lighting in Large Cities.—Mr. C. F. Lacombe (the Chief Engineer of the New York Water, Gas, and Electricity Departments) has, according to the "Electrical World" of New York, stated that much higher illumination is used for street lighting in the large cities of Europe than of America. In London, Paris, and Berlin, the principal streets show intensities as high as 7·9 foot-candles to 2 foot-candles near the sources of light, with a minimum of 0·25 to 0·5 foot-candle at more remote points. In New York, similar streets have maximum intensities not exceeding 1·2 foot-candles on the road surface, while the minimum falls as low as 0·08 foot-candle. In Fifth Avenue, directly beneath the double-lamp standards, intensities of 1·7 foot-candles are found, with a minimum of 0·05 foot-candle. All high candle-power flame arcs in Europe are placed from 3 to 10 feet higher than is the practice in America. By this means clear glass globes can be used.—[We hope not.—Ed. "J.G.L."]

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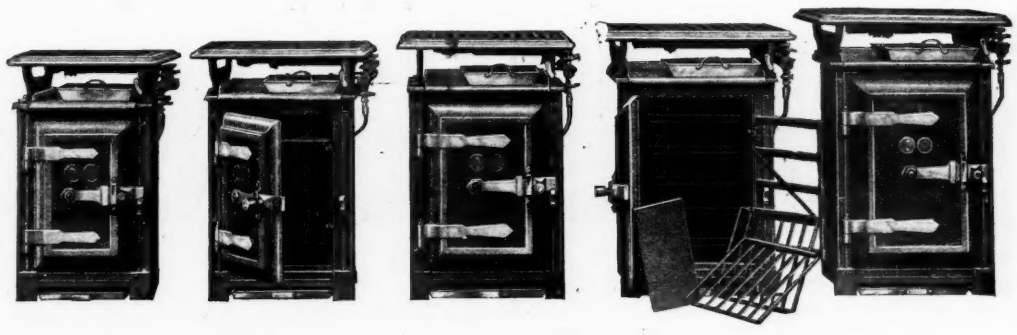

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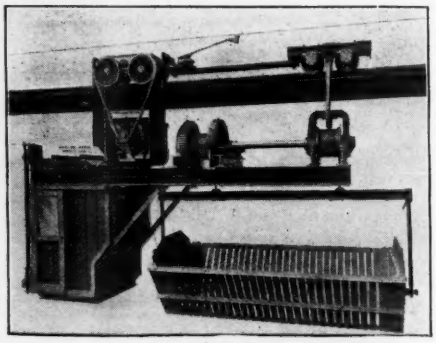

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WALES AND MONMOUTHSHIRE CONFERENCE

OF THE

BRITISH COMMERCIAL GAS ASSOCIATION.—NEWPORT, THURSDAY, APRIL 23.

ONE more was added last Thursday to the list of District Conferences under the auspices of the British Commercial Gas Association, by that for Wales and Monmouthshire, which was held in the Great Central Hall at Newport. The attendance was a very fair one considering the difficulties presented by the scattered nature of the gas-works in the area, though it was somewhat dwarfed by the size of the hall. As a matter of fact, there were between sixty and seventy present at the opening of the proceedings, a large proportion of them, of course, being members of the Wales and Monmouthshire District Institution of Gas Engineers and Managers. Mr. Harold W. Woodall, of Bournemouth, and Mr. Norton H. Humphrys, a Director of the Pembroke Gas Company, were also there. The gathering (which took place in the afternoon) was voted on all hands to have been a great success; and the hope and belief were expressed that it would in due course be followed by other similar ones. In the evening, in the same hall, Professor Vivian B. Lewes lectured on the "Hygienic Value of Coal Gas as an Illuminant and a Fuel;" and afterwards there was a reception at the Westgate Hotel, to meet the Directors of the Gas Company. At the afternoon meeting, two papers were read and discussed.

In the course of the proceedings, it was mentioned that a number of letters of apology for absence had been received. Mr. Edward Allen, of Liverpool, wrote saying that he was prevented from being at Newport by a meeting of the Council of the Institution of Gas Engineers; and Mr. F. W. Goodenough said he was kept away by pressure of work from the meeting, which he hoped would stimulate the spirit of progress among the gas undertakings of the district.

A WELCOME BY THE MAYOR.

The meeting opened with a reception of the members and visitors by the Mayor of Newport (Dr. J. Lloyd Davies, J.P.), who wore his robe and chain of office, and by the Directors of the Newport Gas Company.

The MAYOR said he had been asked to give them all a hearty welcome to Newport; and this he had readily consented to do, because the Gas Company was a very great factor in the prosperity of the town. They had, of course, a municipal electrical undertaking; but they looked upon the opposition offered by the Gas Company as a not altogether unmixed evil. They, as a Corporation, were perhaps at times apt to make haste too quickly; and so it was no doubt well that they should be pulled up occasionally. The gas industry had done a great deal to brighten the town, and to make at any rate the domestic life of the people more worth living. He referred mainly to the labour-saving devices which had been introduced, and which he had no doubt they would continue to introduce, in the shape of gas cookers and fires, and many other appliances of this kind. Speaking for the ladies of the town, he could say with confidence that, since the domestic servant problem had become so acute, they had been very happy to be able to obtain such apparatus as the gas people provided them with. As to the Newport Gas Company, as a certified surgeon under the Factory Acts he had occasion to go to the gas-works, and he had told the Engineer what he thought of them—that, as a model of perfection and order, he felt confident they were among the best works in the Principality, or outside it for the matter of that. He felt sure they did their best, not only for the prosperity of the shareholders, but also for the employees, in whom they took keen interest. Further than this, the Directors studied the individual consumers in the town. It was with a great deal of pleasure that he welcomed them on behalf of the ratepayers and citizens generally; and he sincerely hoped that their deliberations would not only prove profitable to themselves, but also be of advantage to the consumers of gas.

Mr. T. G. CARTWRIGHT, J.P. (Deputy-Chairman of the Newport Gas Company), proposed a hearty vote of thanks to the Mayor for his kindness in coming to the meeting to welcome the members of the conference.

Mr. C. E. DOVEY (Deputy-Chairman of the Cardiff Gas Company) seconded the proposition, which was heartily agreed to.

The MAYOR briefly acknowledged the vote, and then vacated the chair.

AN ADDRESS OF WELCOME FOR THE GAS COMPANY.

Mr. CARTWRIGHT remarked that the duty of taking the chair at this stage of the proceedings devolved upon him, owing to the unfortunate absence through illness of Mr. H. Melvill Brewer, J.P., the Chairman of the Newport Gas Company. This was the first meeting in South Wales of the British Commercial Gas Association; and he was very glad Newport had been chosen for it. Though several big new works had been arranged to start in the town, there were still excellent sites available. There was only one industry there was no more room for there. He meant there was no suitable site for another gas-works. A few years ago, when the booming of the electric light began, a lot of people interested in gas took a somewhat pessimistic view of the situation, and rather foretold the extinction of the older industry. But by now this was an altogether exploded idea. The old dog was still alive, and could wag his tail as strongly as, or stronger than, ever. Of course, there was the competition of electricity to face; but as long as it was fair competition they did not object to it. In fact, competition properly conducted was fair to everybody. He hoped these meetings would become an annual affair in this part of the world. They had been held in other parts of the kingdom, and were resulting in good work. The idea was that the members should meet together and discuss the various problems which arose in their business, and help one another. On behalf of the Newport Gas Company, he gave them very hearty greeting, and trusted the visit would not only be a pleasant one, but a gain from a business point of view.

Mr. HAROLD W. WOODALL (Bournemouth), in proposing a hearty vote of thanks to Mr. Cartwright for his kind welcome, said they all much regretted the enforced absence of Mr. Melvill Brewer. It was fitting that the first meeting of this kind for Wales should be held in Newport, because they ventured to call themselves an energetic and progressive Association, and so it was right that they should gather in a town which was so energetic and progressive as they all knew Newport to be. Many of them were acquainted with the Newport Gas-Works, and knew how well deserved were the remarks of the Mayor. Better works could not be wished for. Their cordial thanks were due to the Chairman and Directors of the Gas Company for the hospitality shown them. In fact, on occasions such as this they always felt indebted to their Directors. If it were not for their interest and goodwill, it would be impossible to hold meetings like this; and they all knew how much they would lose in that case.

Mr. T. E. FRANKLIN (Barry) seconded the vote, which was carried, and acknowledged by Mr. CARTWRIGHT.

AN ADDRESS BY ALDERMAN THOMAS CANNING.

Alderman THOMAS CANNING, J.P. (the Engineer of the Newport Gas Company, and Chairman of the Conference), then took the chair, and addressed the meeting. He said he was very pleased to have the honour of occupying the chair. It was not, however, due to any merits of his own, but to the kindness of others. He was proud also that Newport had been selected as the first town for a meeting in Wales of this new branch of a most important Association. He was perfectly certain that this would not have been the case, had it not been for the co-operation and assistance they had had from their neighbours the Cardiff Gas Company, who in this matter had supported them effectively, and in more ways than one. They were specially indebted to the worthy Chairman of that Company and to Mr. Dovey, and last, but not least, to Mr. Clarry, who ably represented their interests in the Association. There were others, of course, to whom they owed a very great deal. In the first place, there was the President of the first congress, Sir Corbet Woodall. They would all remember the admirable manner in which he introduced the Association to the world, the wonderfully clear way in which he put its objects, and how ably he was seconded by Mr. Goodenough. Then there was Mrs. Cloudesley Brereton and their very able Secretary, Mr. William Mason. They would hear presently from Mr. Clarry what work the Association had done; but, when meeting together in a new town, it might be well to mention a few things which were already well known to many of those present, though not to the citizens generally. The gas industry was not a small one, inasmuch as over £140,000,000 of capital was employed in the everyday work of gas making throughout the United Kingdom. There were 90,000 hands engaged in the industry; and to them something like £8,000,000 per annum was paid out in wages. This did not include in any way the other side of the Association, which was connected with the provision of plant and apparatus by means of which the work was carried on. When figures like these were mentioned, there was a possibility that people might consider the Association was a syndicate. This was not the case at all. The object of the Association was to promote the commercial prosperity of the gas industry by co-operative action, publicity, lectures, and the interchange of information at meetings like this. There was one point upon which he would like to lay stress; and it was one that hitherto had not been very prominently mentioned. It was the enormous advantage which the Association conferred on the public at large—in the first place by bringing to their knowledge the most recent improvements. It consisted of members who were engaged in the work of gas making and of those who were engaged in making plant and apparatus connected with gas manufacture. Therefore, though it was an Association of members whose interests were common, they were by no means identical. Consequently, a great Association like this would make known in a really impartial manner the advantages that might

accrue to the public from every improvement which took place. The next thing was that there was an impulse given by an Association like this to manufacturers to put none but their best goods on the market. Then, again, the Association issued advertisements, &c., which increased the output of gas, and had also the effect of spreading the standing charges over a much larger quantity, and must therefore reduce prices. Thus the Association stood to benefit the public at large, and deserved well of them. This should be carefully noted by everybody. In this connection, he would refer to Sir Corbet Woodall's opening address at Manchester in 1912, when he said: "It is therefore desirable that the service side and aspect of our business should be so organized as to ensure that, in every detail of the relationship of buyer and seller, not merely the convenience but the best interest of the former shall be studied by the latter." Again: "I have been thinking much about the Association; and I find in it a means of greatly widening and extending our usefulness to the community, not merely increasing our business and income." So that, while the primary object of the Association must be to increase this business and this income, he wished to emphasize that it was also of the greatest value to the public generally. But when Sir Corbet Woodall spoke at Manchester, only about one-half of the capital he had mentioned was represented; whereas at the present time, he was glad to say, the proportion, had reached some 80 per cent. No doubt the gas undertakings representing the remainder would come in in due course. It was impossible to forget the welcome the Association received at Manchester and Salford. They would have expected, of course, a great deal from Lancashire, because, though he did not say it was more progressive in some ways than their own part of the world, yet there was no question at all that these northern towns took the lead in almost every movement. One thing that struck them forcibly was the desire which was evinced, particularly in the North, to abate as far as possible the smoke nuisance. Well, the Association represented an agency which was the best able of any in the world to do this. There were contained in 1000 cubic feet of gas 500,000 B.Th.U. of heat, all of which could be made use of. It might be said that 35 lbs. of coal contained the same number of units. Yes, potentially. But could one get the units from the coal? No, one could not. Of all fuels, coal used in the open grate was the most wasteful. Not only was a large proportion of the heat units lost, but something worse happened. What was lost was distributed all over the town in the shape of smoke. Thus it was that the Association received so hearty a welcome in the North. He knew there were also other reasons, because in the great mills, factories, and business establishments the value of gas was well recognized, and it was very extensively used. Sometimes the coalowners took objection to the progress made by gas; but he really did not see why they should do so. The gas industry consumed annually something over 17 million tons of the coal produced; and this consumption, great as it was, would naturally be increased with the increase by the public of the use of fuel in the best form in which it could be employed—the gaseous form. Why, then, should there be any objection raised such as he had alluded to? They did not hear of the same objection when it was a question of the use of gaseous firing in steel works, &c. Surely, this policy of the coal people was a short-sighted one; and he hoped it would not continue. Mr. Edward Allen, of Liverpool, in his position as President of the Association, had given them a very valuable address. In fact, no one had taken more zealous interest than he had in promoting the welfare of the organization. Another matter to which he ought to refer was the National Gas Exhibition at Shepherd's Bush. This was a great event, of much value from an educational point of view; and it would certainly be productive of good results for a long time to come. It might be said by some: "Those in the neighbourhood may have benefited, but how about the rest of the country?" They could not have an extension of the use of gas in such a great centre as London, without a corresponding effect being felt all over the land. When an expansion took place in one centre, they might be sure it would spread to other places. He was certain that an impetus had been given everywhere to the study of the value of gas by the public. Since the exhibition, they must have noticed how scientists whose ear they could not gain before had investigated the business of the gas industry, and had written favourably upon it. Recently the "Lancet," which represented a body of professional men whom they particularly wished to reach—namely, the doctors—carried out a fair investigation (which was all that they asked for) of the gas-fire; and the result of this investigation would, be felt perfectly sure, tend a great deal to the extension of the gas business. This was the sort of thing these exhibitions brought about; and it did not matter whether they were held in London or elsewhere. If they benefited one part, this benefit must extend to other parts as well. So far as lighting was concerned, gas held its own. There were people who would take electricity, no matter what it might cost; but at the same time there had been, and continued to be, an enormous increase in the use of gas for lighting. He remembered in 1878, at the time of the Paris Exhibition, when Sir Corbet Woodall was President of the Institution, the members visited Paris, and saw there exhibited for the first time the electric light. Then gas people thought themselves particularly fortunate if they obtained a value of 3 sperm candles in lighting from a cubic foot of gas. To-day, with high pressure, they could obtain from a cubic foot of gas as high as 60 candles. Providence had buried deep in Nature that wonderful force electricity. Science had been able to give it the name of electricity; but it had not been able to define it. The same Providence stored up the rare earths which came into the hands of the gas industry, and which, in the incandescent mantle, had enabled them to hold their own—and in the field of high-pressure lighting to more than hold their own—against every competitor. In the direction alluded to by the Mayor—the domestic use of gas—the success scored had been enormous, and there was no reason to doubt that it would continue. One possible drawback in all matters connected with the supply of gas for domestic purposes was want of economy on the part of the consumer. It might sometimes be thought that this was in favour of the gas industry; but that was not the case. While increasing an individual gas bill, it might be the means of driving twenty consumers away. One method of meeting this difficulty had been tried at Newport, where they had appointed a lady inspector, trained in domestic economy, who went from house to house and instructed people as to the most advantageous and economical ways in which to use their cookers. She had been well received; and he thought the time was coming when it would be necessary to allow her an assistant. The training of the gas-fitter was another important point which had to be borne in mind. In Newport, they had taken considerable steps in this direction. They had appointed a teacher, and had offered substantial sums of money in prizes; and what they were doing Cardiff and other places were doing as well. It was necessary to have good men, and to train the right sort of men. Of course, if a young man showed himself to be unfitted fer the work, he had better be out of it at once. A young man who did not try to do some good for himself would never do any good for others. On the other hand, if a man honestly endeavoured to work his way up, they might be sure he would benefit them. Another thing that must not be lost sight of was the value of the gas-fire at the present day. The distribution of radiant heat in the natural way, as by the coal-fire or by the sun itself, was now obtained by the use of the gas-fire, to the extent of fully 60 per cent. At the same time, the hygienic efficiency of the gas-fire had been made so absolutely satisfactory that there could be no objection to its use on the ground of mechanical deficiency. It was one of the greatest improvements that had been made in their business in recent times, and held out big hopes for the future. It might be that later on some of these principles would be applied to the gas-cooker; and therefore there were before them great possibilities of increasing the usefulness and at the same time the economy of gas. One other point was the use of the modern gas-engine. He was afraid that in certain places this was somewhat falling behind, and that the electric motor was to-day getting more than its proper share of the work. He knew there were difficulties, and that electric motors had often been offered on terms which had not hitherto been possible in the case of gas-engines. It might be advisable at this juncture to carefully consider what might be effected under the hire or hire-purchase system. With reference to the actual amount of power obtained for an equal sum of money from a gas-engine and from an electric motor, much ignorance prevailed among the public. They often thought that if they got electricity at 1d. per unit they were obtaining it more cheaply than they could gas. Taking the case of Newport, with gas at 2s. 4d. per 1000 cubic feet, the cost of a brake horse power was 0·448d. For an electric motor, with current at 1d. per unit, the cost per brake horse power was 0·745d. In this figure, he had given the electric motor what it was not entitled to. He had reckoned its efficiency at 100 per cent.; whereas he believed with some of the best motors one did not get more than 90 per cent. efficiency, which was a very high figure. But giving it 100 per cent., it would still be 0·745d. On this basis, a 20 B.H.P engine, supplied with gas at 2s. 4d. per 1000 cubic feet as in Newport, worked out at 8·96d., or as nearly as possible 9d. per hour; and for the electric motor the figure worked out at 14·9d., or nearly 15d., per hour. That was to say, the user of a 20 B.H.P. gas-engine would obtain this full amount of power for 6d. an hour less than would be the cost with an electric motor. In conclusion, he would remark that they had all of them one great object in view, whether they represented gas companies, municipalities, or manufacturers. This object was not only to maintain the industry at the high pitch it had already reached, but to bring it even higher still. The effect of a great Association like theirs must be to aid gas in keeping in the front rank of the national industries, and in maintaining the same progress and the same vitality as the nation itself.

Mr. H. D. MADDEN (Cardiff) proposed a hearty vote of thanks to Alderman Canning, and remarked on the strides the industry is making, both on the manufacturing and distributing sides. During his long and honourable career, Alderman Canning had seen great changes take place. Now they had a co-operative movement in the shape of the British Commercial Gas Association; and this would greatly assist them in working towards their common end, which was to increase the use of gas.

Mr. R. A. BROWNING (Neath), in seconding, referred to the good work done by Alderman Canning for the Wales and Monmouthshire Institution.

Alderman CANNING acknowledged the vote.

AN OPENING FOR THE EXPANSION OF BUSINESS.

Paper read by GEORGE CLARRY, F.C.I.S.,

General Manager and Secretary, Cardiff Gas Light and Coke Company.

Our meetings to-day are convened at the instance of the British Commercial Gas Association, and a few notes upon its scope and

work may not be out of place, although I am aware that from time to time particulars of its formation, and subsequent doings, have been duly reported in our Technical Journals. In case, however, some of those present have not followed its history very closely, I may state that for many years the want of a properly organized Association, thoroughly equipped to advance the interests of the gas profession, was felt by those who, single-handed, have had to face difficulties and provide the necessary impetus to greater advancement in their own area of supply, and much individual effort was required to carry on such a campaign, which, of necessity, could only produce limited and transient results.

Formed less than three years ago, the institution known to all the world and his wife as the "B.C.G.A.," having successfully passed the initial stage, presents to-day all the ripeness and vigour of a well-matured National Organization. If there is anything about its constitution which appears to be lacking, it is the want of universal support, which ought to be (and I say confidently will be) given to it in the near future. No half-measures, and no faint praise, will satisfy. It is the bounden duty of all to join, and the way is open to all.

Perhaps it may seem bold to claim so much for a newly-constituted body; but boldness, tempered with discretion, has been the very keynote of the Association's existence. It should be remembered, and I venture to repeat, that until the British Commercial Gas Association came into being, the gas industry possessed no organized method of exploiting business; no banding together to make the advantages of our commodity generally known; no interchange of experience among those responsible for the commercial side of our business; no combined effort to counteract misconception and to silence misrepresentation. But, greatest of all, perhaps, we had no convenient opportunity of bringing home to the minds of the great scientific world—those whose convictions and announcements in the public press, the lecture room, and on the platform, may be said to mould public opinion—that in the use of gas we have the means ready to hand of bringing health, comfort, and the alleviation of many ills, which inevitably follow an advanced civilization.

What are the Objects of the Association?

Briefly, it may be said the Association assists us to help ourselves. It points the way to success, but that success is only attainable as we measure our strength against organized opposition. Let it be admitted we have many opponents to overcome, and some indeed seem very difficult to shake off. Perhaps the greatest opponent of all has been, at least in the past, self-complacency—that old story of the dweller in a fool's paradise, who persistently shuts his eyes to outside influences, and refuses to be moved, because, forsooth, things will come out right somehow in the future, as they have always done in the past.

But, it may be asked, does not your Association go forth like a knight of old, to meet and to crush the hated rival, and grind him in the dust? No! Our answer is we are not out to attack others, we are not anti-this or anti-that—we are here to defend and to develop the cause of the gas profession, and all our efforts are directed towards making ours the best and most acceptable commodity. In short, we are the servants of the public, and, like all good servants, we aim to make ourselves indispensable.

First Efforts.

The early policy of the Association was directed towards making itself widely known through the medium of the Press. Their illustrations and descriptive matter are now so familiar that very few newspapers or magazines appear without some striking example to arrest the reader's eye. In this way, seasonable announcements have been made in the newspapers circulating within our own district, and have stimulated thought and inquiry among the gas consuming public.

The next important feature of the Association is the educational question, which assumes many and diverse forms—not visible on the surface, but which are no less influential or effective. Here we have active research work being conducted by eminent authorities, dealing with the hygiene of gas for lighting and heating, in which the problem of ventilation is scientifically and impartially treated.

Again, we have professors of the highest scientific attainments engaged delivering lectures, whereby valuable information upon domestic science is disseminated; while school teachers have had useful papers on the manufacture and manifold uses of gas placed in their hands in the form of notes for lessons, the subject being included in the Education Code.

Official Publications.

Attention can only be drawn very briefly to the solid work done by means of the Association's own publication, "The Bulletin," issued to all members; also to the numerous pamphlets, each dealing in an authoritative and attractive form with some particular branch of our business. These pamphlets, be it known, are available for distribution by members to their consumers, and are supplied at quite a nominal charge above the cost of production. A special word should be given to the monthly paper entitled "A Thousand and One Uses for Gas," which illustrates and describes for the benefit of manufacturers and others the really marvellous service which gas can perform in the workshop and the laboratory.

Then, again, there are those misleading and derogatory articles or statements, made public presumably through ignorance or prejudice—statements ranging from a downright lie to a plausible half-truth, which require refutation, or at least a fair and impartial explanation. Left alone, these mischievous calumnies develop and spread like ill-weeds, which grow apace, and no single gas department could hope to trace their passage through numberless devious channels. But here the Association comes with trained experts, and an ever-widening circle of communication, to speak the correct word, and put matters right. Time will not permit of examples being given, but many instances occur in which the services of the Association, by taking up the cudgels promptly and vigorously, have conferred great and lasting benefits upon a company or a local authority which has been marked-down for one of these covert and unjustifiable attacks.

Residuals.

Among the many and varied activities of the Association may be mentioned a special branch dealing with the sale of gas coke. This important auxiliary to our business is in the care of a Special Committee; and the object of the Association is to do for coke what it has already accomplished for gas. With such a valuable and convenient fuel as coke as an alternative choice to heating by gas, we feel that only publicity is wanted to bring it into the homes of countless thousands who are at present entirely unaware of its advantages in the domestic circle; and we hope so to popularize the use of gas coke by suitable literature and other means, that the benefits obtained from increased local sales will prove a valuable asset to every subscribing undertaking.

This is only the barest outline of what the Association is doing; but sufficient has, I hope, been said to bring to your minds the important fact that, with an accession of strength, propaganda work could be developed and extended very largely, and made of great and lasting benefit to the industry.

Local Support.

What is our attitude in Wales and Monmouthshire towards this organization?

Before proceeding with local matters, let me, however, express on behalf of the Association, whose humble representative I am on the General Committee, our appreciation of your presence to-day, and our grateful thanks to the Newport Directors, and their able and always courteous officers, in giving us the opportunity of holding the first District Conference in the County Borough of Newport.

The district of Wales, which includes Monmouthshire, has in its area 119 undertakings supplying gas to the public. This area is considerable, and many of the gas-works are situated in localities remote from busy centres. In proof of this, you will no doubt recollect that while the population of England is 593 per square mile, Wales and Monmouthshire combined works out at 289 inhabitants per square mile. This scarcity of population does not, however, apply to Glamorgan and Monmouthshire, where the conditions approximate very closely to the populous counties of England. This being so, we should, so far at least as South Wales is concerned, be quite up to the standard obtained elsewhere.

Out of these 119 undertakings, having an output ranging from 1 million to 1400 million cubic feet per annum, it appears that 23 only are subscribing members of the British Commercial Gas Association, which works out at 19 per cent. of the whole number. This percentage is important, as indicating the amount of support given to an Association which, above all other considerations, is designed to assist the small or isolated gas-works, and enable them to develop their necessarily restricted resources.

The percentage of subscribing members will no doubt appeal to you as being inadequate, having regard to the prevailing conditions throughout the country. What position Wales occupies in relation to other districts of the Association I am not prepared to say. This fact is certain, however, that the official records for the whole country show a membership equal to 80 per cent. of the total gas made, whereas in Wales we can only show 44 per cent. of the total gas made as members of the Association. Clearly, therefore, we are very much behind the general average, and a little inquiry as to this hesitancy to come forward will no doubt repay attention, seeing that representation on the General Committee of the Association, and some other privileges, accrue according to the support given.

I venture to hope the discussion this afternoon will indicate some means by which our proportion will be steadily and surely increased, until the position of Wales is pre-eminent in the list of members. It may be that sufficient consideration and prominence has not been given to the claims of the Association by councils and companies in general, or possibly the fault may be ours in not making the objects of the Association more widely known to every individual councillor and gas director, even in the remotest areas of supply.

In looking through the list of 119 gas undertakings already mentioned, it will be found that about 29 are owned by local authorities, and, strange as it may seem, only a very small proportion have availed themselves of membership. This is quite contrary to the practice prevailing in other districts. Manchester, Birmingham, Glasgow, Bradford, Leicester, and Leeds—to name only a few—are all keen followers of greater publicity methods, and what is good for such progressive cities as these, ought surely to be equally beneficial for the enterprising towns in our own neighbourhood. It is hoped the answer may be brought out in the discussion which this paper is intended to initiate. In case,

however, some who are here present to-day, representing district councils, have doubts upon the validity of their being able to join, I would earnestly urge them to refer to the Secretary of the Association, who can give a complete and satisfying answer to this question.

If you are not already satiated with figures, I should like to put before you another aspect of this question—as to the effect upon gas undertakings of publicity work. For this purpose you are asked to consider the joint experience of 24 gas undertakings in our combined district of Wales. First we will take the members, and then the non-members—twelve of each.

The twelve largest membership concerns have a total output of 2510 millions, 98,479 consumers, yielding an annual average of 25,500 cubic feet of gas made per consumer. The twelve largest non-member concerns have a total output of 1042 millions, 59,390 consumers, yielding an average of 17,500 cubic feet per consumer. These figures, which are taken from the latest published official returns, show 8000 cubic feet per consumer in favour of the Association, which means that those in the Association sell 45·26 per cent. more gas per consumer than those outside.

Assuming from the figures stated that the "outside" works could bring up their annual make to the same level as those joined to the Association, it means that the twelve works would send out an additional 475 millions every year; and as the bulk of this increase would come in as part of the day-load, the capital and standing charges would remain practically the same.

It may be well to bear in mind that the mere fact of becoming associated with the B.C.G.A., does not necessarily imply an immediate and steady increase in the sales department. It is by no means a case of "Press the button, we do the rest." We can, however, claim with confidence that the operations of the Association in each district serve to awaken public interest, stimulate inquiry, and lead to the development of business.

Inquiries through the B.C.G.A.

It is but natural that the attractive and business-getting advertisements of the Association should bring a large number of replies and inquiries for further information. This has proved to be the case in every district, and members are duly advised without loss of time. The usual practice of the concern thus notified is to keep a record of all such inquiries received, enter them up in a book kept for the purpose, and the district inspector calls upon the person making the inquiry, with the result that a large number of orders are booked.

Publicity Work.

It is unnecessary at this advanced stage of publicity enterprise to remind you of the many ways open to progressive management for the purpose of business openings; and I will not enlarge upon this branch of the subject beyond indicating in the merest outline what steps are usually taken to raise the average consumption of gas per consumer. In the first place, the showroom department and outdoor staff should work in perfect unison. The district inspector must be constantly on the alert, and never lose an opportunity of getting into touch with every one of his consumers.

Friendly relations between the consumer and the company are absolutely essential, and every effort should be made to see that the gas used is giving the best results. The satisfied consumer is the company's highest recommendation; and a case occurs to the writer in which no less than nine orders for gas-fires in one street were taken directly through the good offices of a consumer, who expressed satisfaction to her neighbours.

Arrangements with builders for the piping of new premises, also with house agents to ascertain particulars of incoming tenants, greatly assist an inspector to widen his sphere of operations.

Experience shows that if left alone, consumers are prone to continue in the old groove, and the extent to which the saving of labour in the household or manufactory may be effected by means of gas appliances is little known, and certainly not appreciated by the general public. Take, for instance, the hot water circulator, which is so indispensable in the summer time, and you will recognize that the use of this veritable treasure is known only to a small percentage of consumers. The same may be said of gas-heating conveniences, especially on a large scale, as in hotels, where in the near future it is hoped every bedroom will be provided with a slot gas-fire.

Numerous other examples could be given; but the position may be summarized by stating that no effort to please and satisfy our consumers is too great, and no stone should be left unturned to provide for their wants, and, further, we ought to anticipate their wishes in all respects.

There is another aspect of the question relating to business management—viz., the duty we owe to those who provide or are responsible for the capital of the concern. The more assiduously the spirit of enterprise is cultivated, and the more its sphere of operations is widened, the greater will be the security to the undertaking, and this naturally gives increased confidence, and satisfaction in the minds of directors and councillors, as the case may be.

Conclusion.

Among the many activities of the Association, mention may be made of the Annual Conference, which brings together from all parts of the country a great cosmopolitan gathering, specially interested in gas enterprise. The Conference at Manchester, and that of last year in connection with the International Gas Congress and Exhibition, proved conclusively how much the industry as a whole is indebted to the organizers for the opportunity to gain additional knowledge, to extend our views, to smooth away difficulties, and to open out the path of progress. The further step taken this year of holding District Conferences affords us yet another opportunity to compare notes, gather fresh experience, stimulate our energies, and enable us to face competition with a degree of confidence unattainable by individual effort.

Critics of years ago were by no means reluctant to offer their commiserations, and to exhort "the poor old gas" to wake up; and she has followed their advice with a vengeance. What they say to-day does not concern us, as we know what to do, and have work before us in plenty. Our commodity is second to none in point of quality, adaptability, aud cheapness, and all we want is to make the commodity supreme.

Our District Conference points the way to vigorous and sustained action; and I venture to submit that it affords a "real opening for the expansion of business."

DISCUSSION.

Mr. T. H. Hazell (Newport) proposed a vote of thanks to the author. The paper was, he said, one that came home to all who had at heart the welfare of the industry in which they were engaged. They knew beforehand that what Mr. Clarry had to say would be well thought out. He was the embodiment of courtesy and goodwill, and was always ready to impart to those who desired it whatever information he was able to give. They were also much indebted to Mr. Clarry for the able way he had represented the district on the British Commercial Association.

Mr. N. H. Humphrys (Pembroke) remarked that, in view of his connection with certain small gas-works, he was rather interested in the reason why such a large proportion of the smaller undertakings in the neighbourhood had not as yet joined the Association. From the little experience he had had, he was inclined to think that if it rested with the managers of the various companies there would be a much larger proportion come into the fold; but, as a matter of fact, it usually rested with the directors. The directors of small companies often took no interest whatever in the progress of the gas industry, beyond seeing that their own little affair paid its dividends. Another difficulty was the raising of capital. In small places, it was not easy to raise money; and directors were frequently afraid of any progressive move, for the reason that it might entail having to issue further capital. It seemed to him that if the missionary efforts of the British Commercial Association could be brought to bear on the directors of small gas undertakings in any way, the result would be of great advantage. From what he had already done in connection with small works, he could say that no one would ever regret joining the Association. The information and assistance obtained—not necessarily in canvassing for business, but in regard to difficulties arising with consumers—were more than anyone would imagine. If there were any representatives present of the ninety odd undertakings who had not joined, he would ask them to follow up the advice given in the paper, and seriously consider the advisability of doing so.

Mr. J. H. Canning (Newport) said the paper well pointed out the advantages which accrued from joining the Association. There were one or two points he would like to emphasize—particularly that part of the paper in which Mr. Clarry drew attention to the necessity for keeping the consumer satisfied. As far as he (the speaker) had been able to judge of the gas business, it was not in any way different from other businesses in respect that success depended almost entirely upon keeping the consumers satisfied. The first thing to remember in this connection was that, generally speaking, a consumer who made a complaint could not be satisfied; and, therefore, they must use all possible endeavours to keep him from complaining. He knew that in saying this he might seem to be giving a counsel of perfection; but there was nothing more necessary than to intelligently anticipate any cause of complaint, and too much emphasis could not be laid on the need for quietly and unobtrusively keeping in touch with the consumers, so as to anticipate as far as possible any want and prevent any complaint. Of course, there would always be a certain number of complaints; but he believed that by constant attention on the part of inspectors, fitters, index-takers, collectors of prepayment meters, lady demonstrators, and others, the consumers generally could be kept satisfied. The adoption of this policy must do very much for the success of any gas undertaking. A man in a perfect state of health should not be aware of the fact that he had any internal economy whatever; and the consumers, in the same way, should know nothing about the presence of gas in the house, except by the good service it rendered to them. Regarding the other point—and it was the chief one on which Mr. Clarry had spoken to them—it seemed very difficult to understand at first why greater response had not been made in this district to the invitation of the British Commercial Association for membership. He was sure there was not a single concern, either in this area or in any other portion of the country, whether subscribers or not, which had not benefited, and benefited largely, through the efforts of the Association. He could not believe they wilfully abstained from becoming members, but rather thought they had not considered the matter as fully as they might have done. When he saw the advertisements of this excellent Association in the daily and weekly papers, he sometimes wondered whether they did not smite the conscience of those who were not members. If they only considered the

matter properly, they would see that the benefits they were at present receiving could only be increased by their joining the Association. By their doing so, the industry as a whole would benefit, and they would all be on the high road to even greater prosperity than they enjoyed to-day. He would recommend those who were not members—if they had not done so already—to visit Cardiff, and see the progress the Gas Company there had made under Mr. Clarry's able direction, assisted by membership of the Association. That, if nothing else, should induce them to become members.

Mr. H. W. Woodall expressed his appreciation of the paper, and said, with regard to the benefits of membership of the Association, it seemed obvious that it was to the benefit of an undertaking to join. He felt certain that no gas company, or board of directors, or manager, would wish to secure the benefit of work and outlay they had had no share in; but, of course, all undertakings did benefit, whether they had joined the Association or not. Mr. Humphrys had made some remarks with regard to boards of directors. One might be inclined to doubt whether there were people like this, if one had not come across them. He (the speaker) was talking recently with a man who happened to be a director of a gas company, and begged him to join the Association, saying: "You are face to face with electrical competition, which will be starting shortly. Do you not think you ought to try to get more gas used?" His reply was quite in accord with what Mr. Humphrys had stated. He said: "Our gas-works are fully occupied. If we want to send out any more gas, we shall have to put down more plant. I shall welcome the advent of electricity, because it will take the surplus business, and that will prevent us having to carry out extensions for years to come." He (Mr. Woodall) fully expected it would. [Laughter.] He agreed with Mr. Canning about keeping the consumers satisfied. This was what they all ought to do. At Bournemouth, by making as many of their mains as possible high-pressure mains, and governing, they had equalized the pressure in all the districts; and they had in consequence had a great falling off in the number of complaints. He thought if they gave a constant pressure day and night, and gas of equal specific gravity as far as possible, they would not have anything like the same number of complaints. Most of the troubles were due to the effect of unequal pressures on inverted burners, which were very useful, but at the same time very delicate, appliances. The Company paid a commission to their inspectors for work they brought in. Probably the inspectors averaged from £40 to £60 a year in commission they received on goods sold. Of course, it was not part of an inspector's work to act as a canvasser; but there were certain people whom an inspector could get at, and a canvasser could not. Then the estate agents could do a great deal, because they could tell one who was coming to live in the neighbourhood. His Company advertised in the circular of each estate agent; and they got from every agent a list of incoming tenants. Then these were written to before ever they came to the town. This was work which they followed up, because Bournemouth had a somewhat shifting population. So far as the business of the Company was concerned, they had had an increase of 9 per cent. in the past quarter, on the top of an increase of 12 per cent. in the same quarter of last year. One of the Directors had asked how these continual increases were secured. He (Mr. Woodall) replied "By work;" but, as a matter of fact, he thought it was other people's work, and more than anything it was the work of the Association. Take the advertising they did. His Company had already had six inquiries in consequence of an advertisement of water-heaters which appeared in the "Daily Mail" some days ago; and he had no doubt they would have more. This was work which could only be done by combination among gas undertakings. The longer the Association went on, the more its work would be appreciated.

Mr. W. M. Mason (the Secretary of the British Commercial Association), in seconding the vote of thanks, said Mr. Clarry was one of the most energetic representatives in the Association. He was a faithful attendant at the meetings, and always took a good part in the discussions on the work going on. It was gratifying to hear so much testimony to the good work the Association was doing. He thought this was now recognized by everyone, even by the non-subscribers. It was not a case of their not being convinced of the utility of the Association and the good work it was doing, but, as Mr. Humphrys had said, it was frequently a case of the directors not seeing altogether eye to eye with them in the matter. If any of those present were in this position, they should seek assistance at the headquarters of the Association. They knew that every gas manager was hard worked, and had such a multiplicity of duties to perform that he could not undertake publicity work as it should be done, by drawing up advertisements and compiling suitable literature. The Association, though it had only been two years in existence, had now got such a service in this connection that it was folly for a man to attempt it himself. The service which the Association was able to render to every gas undertaking, large and small, as regarded local publicity work was simply unique. This should appeal to every director who really desired the progress of his undertaking. Of course, where they had a man who actually wanted business to go, it was useless to appeal to him—except, perhaps, by saying he might as well send £100 to the Association as let it go elsewhere. It seemed to him that often more might be done in the way of local campaigns among special classes of persons—such as architects, doctors, and certain classified householders. A selection of particular sections of the people should be made, and regular work should be done with them. Some of the Association's literature could be sent out with the gas accounts. This would involve no outlay except the cost of the booklets; and they would be astonished at the results of such a campaign. They might take (say) all consumers living in houses of a certain rental and upwards; and then all those who were likely to want hot-water installations put in. The Association had had numberless inquiries from the "Daily Mail" advertisement which Mr. Woodall had referred to; and these revealed a widespread desire on the part of the people to secure information with regard to water-heating apparatus suitable for their houses.

Alderman Canning referred to the portion of the paper in which the author related the experience of 24 large gas undertakings, and gave the average output per consumer of the twelve largest membership undertakings as 25,500 cubic feet, and that of the twelve largest non-member concerns as 17,500 cubic feet per consumer. He did not think Mr. Clarry could mean that the increased consumption in the case of the membership undertakings had arisen entirely from their having joined the Association. What he thought he meant, and what he believed was actually the fact, was that the people who did not take an interest in the Association were those who would not take an interest in pushing their business in any way. If a business was not pushed to-day, one had better drop it; and one of the best ways of pushing the business of a gas undertaking was by joining the Association.

Mr. Clarry, in acknowledging the vote of thanks, remarked that it was very difficult nowadays to write papers which had about them anything of novelty. The point brought out by Mr. Humphrys was one he had entirely overlooked—that was, he (Mr. Clarry) had neglected to properly educate his Directors. [Laughter.] As a matter of fact, however, his Directors sometimes wanted a little pulling in, and he naturally supposed all Directors were the same. But he really did believe there was much truth in the remarks of Mr. Humphrys when they were applied to district councils. They were a more changing body than a board of directors, and consequently what a manager brought forward one year was probably forgotten the next, or not known by those who succeeded in getting on the committee. Mr. Canning had pointed out the secret of the whole business of pushing sales. His (Mr. Clarry's) Company's inspectors made a point of being friendly when going into houses and shops; and the inspection of a gas-fire would give them an opportunity of looking at the fittings. If the fittings proved to be faulty, the inspectors did not mind telling the people so. The Cardiff Gas Company recognized the principle pointed out by Mr. Woodall. It paid them well, and incidentally it paid the inspector, who devoted the day to his business, and then in his leisure time picked up a little commission. He would spend perhaps an hour in trying to influence business in this way, and probably next morning would be able to hand in an order. In this way, the inspector was rightly entitled to some consideration; and the Company did give something for labour devoted to canvassing work of this kind. It was a remarkable feature that the British Commercial Association got at certain people who would not go to the trouble of walking down the street to the gas office in their own town. It was strange; but they saw an advertisement, and wrote to London, and got advice from Mr. Mason, while they would not go into the next street and ask at the counter of the gas office for the same information, which had been there a long time. This only showed how much the Association indirectly benefited all of them. He trusted the meeting that day would result in a largely increased membership.

GAS DEVELOPMENT IN A MINING AREA.

Paper read by Arnold W. Branson, of Caerphilly.

Much has already been written and said as to ways and means best suited for the development of gas sales in the large towns and cities of the country; but I should like to draw your attention to, and provoke useful discussion upon, the question of how far, and by what means, the sale of gas can be successfully improved in smaller communities, such as many of our Wales and Monmouthshire gas concerns serve. As the bulk of those present are, I believe, interested in undertakings coming under this heading, I need offer no apology for the choice of topic.

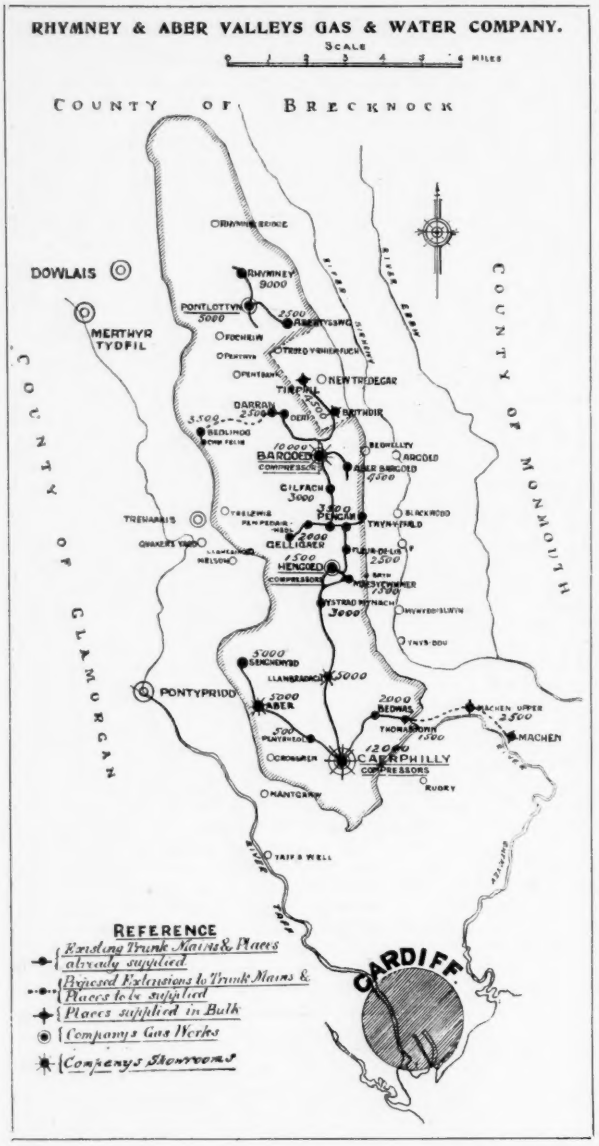
In Wales and Monmouthshire there are only five gas undertakings at present with outputs of 150 million cubic feet per annum or more, out of 119 all told. The reason for this is fairly obvious, for, as we all know, a great proportion of the population is engaged in mining, and is centred around the various collieries up and down the valleys. There are consequently few big towns, but a considerable number of small, and for the most part flourishing colliery towns and villages, with populations of 15,000 down to a few hundred in some cases. The places supplied are mostly served by separate gas-works, and at comparatively high prices per 1000 cubic feet. To advance gas sales under these circumstances is not easy; and where there is not a lot of business to divide, it is especially difficult, when faced with competition in the form of electric light

Linking-up Scattered Places.

Before coming to the means of gas development more generally associated with the terms, I should like briefly to advocate the policy of linking-up colliery districts with high-pressure mains, and centralizing manufacture as much as possible—thus reducing

manufacturing costs, and making the handling of residuals more profitable. This is the scheme which is gradually being carried out in the case of the Company with which I am associated, and with very satisfactory results.

As will be seen from the accompanying plan, there are nineteen colliery towns or villages with populations of 1500 and upwards now being supplied in the Rhymney and Aber Valleys (eleven of them within the last seven years), and spread over an area of nearly 60 square miles. A high-pressure gas-main will also be laid this summer over the mountain, in order to supply Bedlinog in the Taff Bargoed Valley—making twenty. The estimated populations of these places are shown in round figures on the plan.



In addition to two supplies in bulk to neighbouring outside authorities for which arrangements have been completed, we hope to be in a position in twelve months' time to supply seventeen of these places from one works. By linking-up in this way, and picking up practically every village in the district, the output has developed very rapidly—increasing in the last seven years from 34 to 121 millions. It has also been accompanied by reductions in price and capital per million cubic feet, and increases in the dividends paid.

With increases like the foregoing, there is a danger of being satisfied; and for this reason (and probably, in addition, pressure of work) of neglecting the efforts for gas development advocated by the Association. For while it is desirable to go out in different directions to secure every village possible in a neighbourhood, concentration in each particular place is still more desirable, in order to obtain the biggest possible useful consumption there, and an increased consumption per consumer. Increases derived in this way are the most stable and remunerative in character, necessitating as they do a minimum increased capital expenditure. They also help to bring down the price at which the gas can be sold, which, in its turn, helps materially to further increase the consumption.

Good Service and Efficient Publicity Needed.

The means to achieve the object referred to are what we are more particularly discussing to-day. They come under the two heads of "Good and Satisfying Service" and "Efficient Forms of Publicity."

There are some thirty undertakings in the South Wales and Monmouthshire coalfield, and, as I have indicated already, they are unable, for the most part, to sell gas at prices as low as those charged in the bigger towns. But if gas is unavoidably higher in price, it is certainly all the more necessary that the service in other respects should be the best possible. If handicapped in the matter of price, care should be taken that an undertaking is not further handicapped by neglect in the matter of service or in the constant look-out for new business. New business is bound to follow close on the heels of good and satisfying service rendered, in spite of a comparatively high price for gas.

Publicity.

To give this service, and at the same time keep up a constant search after new business, it is essential to be businesslike, and keep our commodity well to the front, just as tradespeople do who desire to succeed.

There are many of us who have not in the past been sufficiently convinced as to the need of advertising—saying possibly, "What need is there of publicity here? Everyone knows what we can do, what appliances we supply, and what uses gas can be put to." But they do not know these things unless they are continually reminded of them; and they are not particularly interested in gas at all unless their attention is arrested, and they are brought to realize the value of gas in the home and in business. I have known people go down to Cardiff, for instance, spending time and railway fares, to buy fittings and appliances which they could have had, if they had only known, from the local gas undertaking in the little place where they lived, and at less price. This shows how little they knew of what the gas undertaking could do for them.

Once convinced as to the necessity for publicity, the best and most economical way of achieving it, in the case of smaller undertakings undoubtedly, is to co-operate with others, by becoming a member of the British Commercial Gas Association. Beyond saying that the formation of the Association has proved a great boon to those who were already convinced of the need of publicity, by bringing (among other things) within their reach a class of artistic and up-to-date literature which would otherwise have been prohibitive, and that it has also in many instances awakened talents in that direction which had been dormant, I will not dwell on this matter, for the Association's work and aims have already been ably described by Mr. Clarry, who is so pre-eminently fitted to speak on the subject by the marked success which has resulted from the publicity methods adopted in the City of Cardiff. I should like, however, to pay my tribute to that useful and interesting publication, the "Bulletin." I consider it most valuable to gas salesmen, and, in fact, to all concerned with the sale of gas; and among my own staff it is looked forward to with interest.

There are a number of effective forms of publicity within the means of practically all, such as these: Advertisement slides on cinema screens; advertisements on variety stage curtains and programmes, in local papers, and in church and chapel magazines, changing the matter periodically; the sending-out regularly of good class literature and illustrated lists with the accounts, receipts, and correspondence; gas exhibitions periodically; cookery lectures, with essay competitions for school children, and small prizes for same. It is gratifying to note that a cinematograph film is being prepared in connection with the manufacture and use of gas, and will be available for hire by subscribing undertakings at moderate rates. In many colliery towns, the cinema is the only place of entertainment, and is very well patronized. In the Rhymney and Aber Valleys, for instance, there are seventeen of these places. The proposed film should, therefore, prove very useful indeed to gas undertakings in mining areas, when used in conjunction with their local advertisement slides.

Show-Rooms.

Any scheme of publicity would be incomplete and crippled without a show-room; and yet in the case of an undertaking serving small places it is a difficult question to decide upon, as it is obvious that in many cases the amount of trading to be done will not leave a margin of profit after paying expenses. No manager likes to put propositions of this kind before his board of directors or committee; and yet there are many small concerns in which, even under these circumstances, a show-room is a business-like proposal.

Unfortunately, small communities are often badly served as far as local private plumbing or fitting work is concerned, and the gas authority suffers from complaints of "bad gas" arising entirely from inefficient work done by men over whom they have no control. In order to get jobs, prices are "cut," and pipes quite inadequate in size put in, with unsuitable fittings and cheap, inefficient burners. I remember, for instance, a case of a $\frac{3}{8}$-inch compo. pipe fixed by a local plumber on the facia board of a shop, in order to supply three three-light outside lamps; and numbers of other flagrant cases could be quoted if it was desired. Where such conditions exist, and until gas undertakings can compel the gas-fitting trade to comply with a definite specification as to sizes of pipes, class of burners, and fittings generally, a show-room displaying the right type of appliances, with a competent man in charge, is a necessity, and is in the best interests of the public and the gas undertaking.

My experience in connection with show-rooms for small places

may be useful, or may draw something useful from others. Some four years ago, the Company with which I am associated took gas to the village of Llanbradach, which at that time had a population of about 4000. The electric light people followed a few months later. There was not a great lot of business to divide, and it was natural—on our part, at any rate—to want it all, if possible. To further this worthy object, a temporary show-room was opened, and the Electric Light Company did the same on the other side of the street. After a few months of continual canvassing on their part and ours, they closed, but we did not. We had found the shop and show-room so useful in keeping in touch with consumers, that it was decided to lease the premises, and put in a man to live there. He attends to the maintenance of consumers' burners (both slot and ordinary) and to complaints, and does the fitting work, with some assistance in busy times, keeps a look-out for new people coming to the place, and a watchful eye on the electric light canvasser, who makes spasmodic appearances. There is very little building going on there, and the sales do not amount to a great deal—certainly not sufficient to make the place pay simply as a "shop." The deficiency, looking at it in this light, averages, at an outside figure, about £50 per annum. But it is a convenience to consumers, and of valuable assistance to the Company in retaining their business—in that sense paying very well.

In the early part of last year it was decided to open two other shops—a small one in the Aber Valley, where there is a population of about 10,000 and electric light competition, and another, rather more pretentious, at Caerphilly, which has a population of about 12,000. The Aber Valley shop is on the same lines as that at Llanbradach, with a man performing similar duties living on the premises. The Caerphilly shop is in charge of a salesman and inspector, and no one lives on the premises. The sales effected exclusively at this show-room for the twelve months ended March 31, 1914, amounted to £608, the gross profit on which was sufficient (and I might say frankly only just sufficient) to meet the whole of the charges incurred, including the salesman's wages and commission, but excluding gas used. The sales included 34 cookers, 35 fires and radiators, 83 outside and inside lamps, and £256 worth of burners and fittings. The annual gain in consumption, the convenience to the consumer, the advertisement due to the lighting and show-room display, and a resulting improved public opinion of gas, in my opinion, have fully justified its existence.

I am satisfied that the three show-rooms in question have been responsible for a good deal of the increased consumption in their respective areas, and for new consumption that would not otherwise have been secured. This is supported by the fact that there is an increase of 1300 cubic feet per ordinary consumer in the area of the rooms, against an increase of 300 cubic feet per ordinary consumer in the remainder of the district—comparing the year 1913 with 1912 in each case. I might also add that at the end of January last a fourth show-room was opened at Bargoed, where there is a population of some 18,000 within a mile radius; and the gross receipts for the first two months amounted to £96. This shop is already bringing us into closer touch with consumers, and is undoubtedly necessary.

These places are in no case pretentious; but they are inviting and attractive, and they compare favourably with any of the other shops in their vicinity. They are well lit outside and inside, are considered for this reason an acquisition by neighbouring shopkeepers, and are equipped with the latest and best appliances obtainable by consumers upon favourable terms. I believe it will be found desirable eventually to open others in the district.

Cultivating Consumers' Tastes.

There is a great deal of similarity in the requirements of consumers in colliery districts, and our experience has been that it is policy to cultivate a taste for one or two particular sized cookers, giving them popular local names. Cookers of the intermediate type, that can be sold at from £3 to £3 10s. for cash, or at corresponding hire-purchase rates, we have found sell particularly well. In the same way with fires. It is our endeavour to popularise certain series, and offer them on low cash terms or on hire-purchase; fixing free in the case of fires, but charging for materials only in the case of cookers. We do the same with lamps, both for inside and outside lighting. Our experience is that the principal shopkeepers are always on the look-out for a good light; and if you can demonstrate to them that the article you have will accomplish this object, they will adopt it with alacrity.

Good and Efficient Service.

It is often the case with the gas manager of the smaller undertaking that he has so many matters to attend to himself, and is so fully occupied in one way or another, as to be quite unable to keep in close personal touch with consumers, and to properly follow-up opportunities of new business. In cases of this kind, to add to his responsibilities a show-room, without additional staff is mistaken policy, as it would become a "dead and alive" sort of place as soon as the first novelty had worn off. To obtain satisfactory results, it is necessary to appoint a competent salesman and inspector; and, given the right type of man, his services will be well repaid. In the choice of this member of the staff, particular care is necessary, as he will be the connecting-link, to a large extent, between the consumer and the gas undertaking. I would advocate paying, in addition to his salary, a small uniform commission on each cooker, fire, geyser, lamp, &c., sold for cash or on hire-purchase, irrespective of the cost of the appliance, believing that a uniform commission is preferable to a percentage one. My fear in the latter case is that an appliance bigger than is really required by the consumer might be pressed upon him, and result in dissatisfaction later.

In our own case, the Caerphilly and Bargoed show-rooms are under the special charge of the salesman and inspector, and he works from them, and makes appointments to meet customers there. The maintenance men also work from the show-room, are under his control, and account to him for all materials and work done. The salesman and inspector also follows on after the fitter, to see that the consumer is satisfied after the jobs are completed. After seeing his maintenance men started out in the morning, he goes out calling on consumers, returning to the show-room at stated times—a youth being in charge during his absence. In the evening he remains in one show-room or the other until closing time. The meter reading is also under his supervision, and is doue by the maintenance men, for I believe the more the salesman and the maintenance men can come into touch with the consumer the better. Should any consumer's meter show an abnormally high or low consumption, they are the best able to judge of its accuracy, knowing, in most cases, more of the circumstances. Lastly, a manager should see the salesman and inspector daily, and hear in considerable detail what he is doing, help him with suggestions and information, and generally encourage and back him up in every possible way.

Maintenance Men.

We have two classes of maintenance men—those who look after the ordinary consumers, and those who call upon the free installation consumers. The ordinary maintenance work is charged for at 6d. per burner per quarter, excepting chapels and churches, which are charged at 5d. The free installation maintenance men call monthly upon the slot consumers, and if a mantle or a chimney is required they charge 2d. each for them, putting them on and doing what is necessary to clean and adjust the burner free. They are also given periodically a list of slot consumers whose consumption is small, and endeavour to ascertain the cause and, if possible, remedy it. In any case where there is a free cooker, and they report that there is little prospect of the present tenant using it to any extent, it is removed and fixed elsewhere. We have also found it a good plan to let the slot maintenance men accompany the slot collector on his round, and take mantles and glasses with them in the hand truck used for collecting coppers. When the box is opened by the collector, many of the slot consumers have money returned to them owing to reduction in price; and this often induces them to buy a few mantles to keep by them. The call serves as a monthly visit, and is also of assistance to the collector.

The slot installations are fitted with the Bray "06 No. 3" burner, consuming as nearly as possible 3¼ cubic feet per hour, and giving an ample light for the rooms of cottage homes. At one time we used the "06 C" Bray burner, but found the consumption per hour too heavy for some of the slot consumers, causing them to use the gas very sparingly; many of them taking the burners off, and fixing in their place "Bijou" burners purchased from hawkers at the door. The smaller burner now used has overcome this difficulty, and consumers are very much better satisfied with the number of hours' light for a penny. I attach considerable importance to the maintenance of the slot consumers' burners, as we have found that if the visits of the maintenance men are not kept up regularly, the consumption is adversely affected. Many people do not bother to go to a shop for a new mantle straight away when the old one is broken, and drift back to oil-lamps, especially new tenants coming into a house and finding the installation incomplete.

The ordinary maintenance men also fix any fitting or appliance ordered at the show-room, in cases where no materials are required other than those from the show-room, such as the fixing of burners, lamps, cookers, or fires, when there is already a point provided, or running and fixing pneumatic switches. The men being under the direct control of the salesman, he is in a position to make a definite promise in such cases as to when the work will be done. A fitting or appliance has often more attraction for a customer when he hears that it can be delivered and fixed practically at once.

Fitters.

Another very important matter in connection with the development of the sale of gas is the question of fitters. Much has been said and written lately, and rightly so, as to training the fitter; but it behoves every gas undertaking, regardless of its size, to see that the fitters they employ are men who, in addition to being competent workmen, have a good appearance (if possible), are tidily dressed, and possessed of a fair share of tact, coupled with good manners. The latter is most essential. A case was brought under my notice of a very uncouth fitter, who apparently had cultivated a conscientious objection—so fashionable nowadays—to taking off his hat when going into a house. A lady in whose house he had to work on several occasions became so annoyed that she felt bound to reprove him, and quite politely asked him if it was his custom to go to bed in his hat. Alas, the veiled hint was wasted because when he left the house he asked his mate what the lady meant by the remark. On another occasion, a fitter, when taken to task because, when fixing a gas-cooker, he went away leaving the gas alight at a faulty joint he had made, felt aggrieved, and put forward as an excuse the fact that it was only a little leak.

Next to the inspector, the fitter is probably the man who comes

into closest touch with the consumer; and he can do much to foster the use of gas by seeing that every apparatus he puts in is fixed neatly and left properly adjusted. If the consumer is in any doubt, he can be advised as to the best and most economical way of using the apparatus. Consumers usually appreciate a little advice from practical men, and I think much more could be done by fitters, without being too talkative, in reminding consumers that new and up-to-date fittings, to take the place of the ugly and obsolete ones so often found in premises, can be had on reasonable terms from the local show-room, if they were given to understand that their efforts in this direction would be appreciated in some practical sort of way. There is plenty of scope for work in this direction, and it would, I believe, remove very many complaints of "bad gas" which consumers make to other people instead of to the gas authority themselves.

Carcassing and Fitting-up Houses.

There is still a great shortage of dwelling-houses in parts of the coalfield, and hundreds have been, and are still being, erected by councils, clubs, and garden village companies. Here is a big opportunity for gas development. But unless these houses are fitted for gas with pipes and fittings complete, when first built, it will mean the fixing of free slot installations later on, which is not advisable if it can be avoided. The policy we have adopted is to approach those who are about to build, as soon as we hear of their proposal, and offer to carcass the houses during erection, and provide and fix fittings and incandescent burners at prices ranging from 20s. to 30s. per house, according to the number of lighting points. We show them how much more desirable their property will be when tenants can, immediately they take possession, have gas at the ordinary price, instead of having to pay 10d. or 1s. more per 1000 cubic feet, as in the case of a free installation provided by the Company.

In all cases a ½-inch pipe is run to the farthest point, so that it may be used, if necessary, for a small cooker, which the tenant can hire at 1s. 6d. per quarter, or buy on hire-purchase terms. The result is that practically the occupier of every house fitted in this way uses the gas, and more freely than a free installation consumer; the gas being cheaper, and a greater number of lighting points available. We have now in hand contracts for nearly 800 houses fitted on these terms. There is a loss incurred in this fitting work averaging about 7s. per house; but some proportion of it may be fairly suspended if too heavy to be borne out of the revenue account in any particular year. This course is, to my mind, preferable to the fixing of free installations, depreciation on the capital cost of which has to be met annually. Many of these houses are fitted with baths; and we have tried to introduce gas-geysers, but so far without success. I do not despair of doing so ultimately; for if the apparatus was installed I believe the collier would not grudge the penny daily for a good hot bath. There would be the minimum of trouble to the housewife, and a certain economy in summer time.

We have carefully considered the policy adopted in some towns of an arrangement to pay the local builder a certain sum per lighting point provided by them in new houses, so that the choice of illuminant may be more likely to be gas. But the difficulty with cottage houses in the valleys, in nine cases out of ten, is that the incoming tenant is not prepared to buy any fittings, even if the house is piped-out ready. In houses where there is a free installation already, and the tenant becomes the owner, as is often the case in building club houses, we endeavour to sell to the consumer, the installation at its depreciated value and change the meter for an ordinary one, or a slot set at the ordinary price—our experience being that they become larger consumers, and often buy additional fittings, a bigger cooker, or a gas-fire.

High-Pressure Lighting.

I referred earlier to the linking-up of a district with high pressure mains; and if this is done, it brings within reach of the smaller gas undertaking another means of development and of successfully competing with the electric light—viz., high-pressure lighting for places in the neighbourhood of the compressing plant and on the route of the high-pressure mains. It leaves it then very much of a question as to what terms an undertaking can offer consumers for the installation of the lamps and a supply of gas, including maintenance, and whether at these prices there is a sufficient demand to warrant its adoption. I find there is an increasing number of inquiries for high-pressure lighting from tradesmen in our district, who have seen it in Cardiff and other cities. I believe the question is well worth careful consideration for the busy shopping centres in colliery districts.

Keenness and Enthusiasm Necessary for Securing Gas Development.

In conclusion, I would emphasize what has been repeatedly said—that the best of schemes for gas development, either in districts like ours or in any other, will give very poor results unless they are backed-up with genuine keenness and enthusiasm from the manager downwards. He should be particularly keen, and endeavour by tactful correspondence and dealings with consumers to win their confidence in him personally. Lastly, I would urge all not to be in any way pessimistic if obliged to charge a comparatively high price, as there is scope, even under such circumstances, for considerable gas development.

DISCUSSION.

Alderman Canning said the paper was a very practical one; and he regretted the time at their disposal was so short for discussing it.

Mr. J. E. Kenshole (Merthyr Tydfil) remarked that a good many of those present had the duty of supplying gas in colliery districts, which was a totally different matter from supplying it in large towns. They did not get the same consumption from the cottage consumers in colliery towns or villages. The colliers and officials connected with the collieries got their coal for next to nothing. In fact, most of the officials did get it for nothing; while the amount paid by the colliers was so small that he had known houses in which the fire was not allowed to go out from one year's end to another. In cases like this one could not expect anything like the same cottage consumption as would be experienced in Newport or Cardiff. In cases of linking-up, did the author intend to govern the high-pressure mains at the junction with the ordinary distributing mains, or would the consumers be taken off the high-pressure mains direct, and each consumer be governed-down? Or was he going to put the gas into holders in these districts by the high-pressure main, and distribute from there? There was no doubt that show-rooms were a necessity in all these places. He opened a show-room a couple of months ago, and had done a considerable amount of business. Taken by itself as a shop, he never expected it would pay; but considering also the increased business and the advertisement they got from it, he thought it was a very good paying proposition. He was considering whether or not to open a small show-room in one of the out-districts, which he believed would help him considerably.

Mr. Madden said he wished to congratulate the author, knowing something of the difficulties he had to contend with in a colliery district. Several members, he believed, could give similar testimony on the show-room question. Their business had developed enormously through having small show-rooms in different villages. As Mr. Kenshole had mentioned, a great many colliers got coal at a very low price. This was a difficulty; but it was one which in time would be fought and overcome, chiefly by the aid of the Association. As to the inspectors and the outdoor staff generally, he thought this was going to be an important matter for them in the future. Much had been done to prepare for it; but those who were in the gas profession now were really in the "firing line," and it was others coming along who would have to deal with even more difficult questions than those which arose at the present time. Sir Corbet Woodall had started a very fine system of education in London; and this was the way to keep gas in the forefront, and drive home the nails which the Commercial Association were turning out.

Mr. L. J. Langford (Abertillery) said Mr. Branson had charge of a district similar to his own. The only difference was that the author of the paper served a Gas Company, whereas he himself served a District Council. Of course, he (the speaker) was faced with the problem of the local plumbers, who very much objected to any canvassing on his part. Though he had repeatedly tried to get over the difficulty, he had not succeeded with his Council. However, he had been much interested in the paper which Mr. Robert Watson, of Doncaster, read recently at Bradford. He saw that Mr. Watson had got over the difficulty in a way which would perhaps prove to be the solution of his own difficulties. They would have to co-operate with the plumbers. Already several interviews had taken place with them. He had not a show-room, and realized how much he was behind the times, and how much more business he could do if he had one. The growth of business Mr. Branson had secured was really phenomenal; and he heartily congratulated him on the methods employed to this end, and also to satisfy his consumers.

Alderman Canning, referring to the question put by Mr. Kenshole regarding high-pressure gas, said that in Newport they linked-up the outside district to the town. They had also within the town itself a high-pressure district. In both of these cases they governed the gas with Johnson-Reynolds governors, fixed in duplicate, with the usual pits and connections. Whatever pressure was necessary for the area was regulated there. The governors were capable of giving any pressure at the outlet, from (say) 12 inches downwards. The inlet pressures in the governors themselves varied with the output. As the output became greater, there was a lower pressure; and so on. No consumer was governing his own gas. He was sorry they would not be able that evening to see the high-pressure lighting in the town itself. There was a great deal of it; but unfortunately it happened to be early closing day, and the only lamps alight would be a few in front of the show-room. The shopkeepers preferred this system of lighting to any other for the outside of their premises. He proposed a hearty vote of thanks to Mr. Branson for his paper.

Mr. Octavius Thomas (Pentre) seconded the proposition, which was cordially agreed to.

Mr. Branson said he had been asked whether he connected consumers direct to the high-pressure main, or to a low-pressure main. In very few cases had they any consumers directly connected to high-pressure mains. They were connected to the low-pressure system, which was fed from the high-pressure mains. Two villages were fed from the high-pressure main entirely, and were working at about 4 lbs. per square inch.

Votes of Thanks.

Colonel A. P. James moved that the best thanks of the Association be accorded to the Newport Gas Company for their reception

of the members, and for their kindness in making such excellent arrangements for the purposes of the conference.

Mr. R. G. CLARRY (Swansea), in seconding, remarked that Swansea would join the Association, and start a campaign.

Mr. CARTWRIGHT, in acknowledgment, said that when the time came round for the next meeting in Newport, he believed they would find that all the 119 undertakings mentioned by Mr. Clarry had become members of the Association.

Alderman CANNING said they had had a successful conference, and for this their thanks were due to Mr. Octavius Thomas, the Hon. Secretary of the Welsh Association, and Mr. Hazell. He proposed a hearty vote of thanks to them.

The proposition was carried with applause.

The members then separated, to meet again in the evening to listen to Professor Lewes's lecture and attend the reception.

SOUTHERN DISTRICT CONFERENCE

OF THE

BRITISH COMMERCIAL GAS ASSOCIATION—REDHILL, MONDAY, APRIL 27.

Address by W. J. SANDEMAN, of Croydon.

It is my privilege, as Chairman of this Conference Committee, to give you a brief description of the valuable work which the British Commercial Gas Association is carrying on for the benefit of our industry.

The Association was founded a little less than three years ago for the purpose of developing the sale of gas by organized and concentrated effort in the direction of bringing prominently before the public the many ways in which it can be usefully employed in its service. I can safely say that the Company which I have the honour to represent, and which has supported the movement since its inception, has undoubtedly secured an excellent return on any outlay it has incurred; and I have little doubt but that many other companies can record a similar experience.

Taking gas output as the basis, the Association has already secured the support of nearly 80 per cent. of the industry. There are, however, some 1100 gas undertakings out of 1600 which have not, so far, joined the movement; and it is hoped that the facts regarding the advantages to be derived from association with the Society, which will be made known at this and similar meetings, will before long result in a considerable addition to the number of contributing undertakings.

The Association may justly be proud of the progress it has made, when one remembers that it is only within comparatively recent years that gas undertakings have awakened to the fact that if outputs are not only to be increased, but even maintained, business must be conducted on modern commercial lines. We can no longer afford to cherish the idea that gas will sell itself, or that business once secured can be maintained without continued effort. The consumer demands more attention every year; and we cannot fulfil our duties to our shareholders unless every endeavour is made to satisfy these demands. Even to-day many of us do not realize that our business is of a competitive nature, and that we no longer have the field to ourselves. I, for one, do not believe that we have anything to fear from competition, provided we conduct our business on sound up-to-date commercial lines, adopt a vigorous publicity campaign, and give to our consumers the good service which present conditions render of such paramount importance.

Gas possesses so many inherent advantages for domestic and industrial purposes that there should be but little difficulty in persuading the public to make full use of it. It is, however, absolutely necessary that money should be freely spent on advertising. Much has already been done in this direction locally; but while local effort must continue to do much, it cannot accomplish all that is requisite. To quote only one instance: No single gas undertaking can afford to advertise in the important daily papers, magazines, trade journals, &c., in which the artistic and effective advertisements of the Association appear from time to time, and which urge the claims of gas upon a large proportion of the public whom it is impossible to approach in any other way. During the past two years, the Association has advertised in all the most important National newspapers, magazines, society, professional, trade, and business mediums—publications found on all bookstalls, and and which reach the reading public all over the country.

The value of this work cannot easily be estimated. But it will be admitted by all that it does much to establish in the minds of the public the many advantages which may be derived from the use of gas, and to prepare them for its adoption when the time is ripe, or the opportunity presents itself.

In connection with local advertising, which (as I have said before) must not in any way be diminished, but rather increased, the Association supplies subscribing undertakings with suitable matter prepared by experts. This relieves already fully-occupied officials from the onerous task of writing advertisements which will appeal to the public—work which in these days requires expert handling. It also supplies blocks of sketches by eminent artists, dealing with the different uses of gas, at a cost of a few pence, or a mere fraction of the expense that would be incurred if any single undertaking had to have them prepared. In Croydon, we have made full use of the Association's services in this direction; and it is hardly necessary to say that the value of our local advertising has been greatly enhanced thereby.

The Association's work is also largely educative. It aims at teaching the salesman, and, through him, the customer, how to obtain the utmost value from the gas consumed. In this connection, I would especially refer to the "Monthly Bulletin," so ably edited by Mrs. Cloudesley Brereton, and also the periodical entitled "A Thousand and One Uses for Gas." Both of these publications ought to be in the hands of every official who comes in contact with consumers and prospective consumers. The numerous scientific pamphlets published by the Association are, likewise, of incalculable value in fighting competition and securing business.

Much useful work has been undertaken in connection with educational, medical, sanitary, and other authorities. This is work which, obviously, cannot be taken in hand by any one undertaking, and which is of far-reaching importance to the industry in breaking down old prejudices against the use of gas. The fact that the medical profession, instead of condemning gas-fires, now recommends their use is largely due to the pioneer work of the London Companies, actively continued by the Association for the benefit of the whole industry. In Croydon alone, we have, during the last two years, increased the number of gas-fires on hire from 7800 to 12,000, and, in addition, a large number have been sold outright. I do not claim that this is entirely due to the Association's propaganda; but I am confident it has been of considerable assistance in obtaining these results.

That the work so ably carried on by the Association is stimulating sales is, I think, apparent to all; and it is, therefore, the more difficult to appreciate the attitude of the undertakings that are still holding aloof. It has been said, although I can scarcely think with any serious intent, that the Association is a London organization aiming at furthering the interests of undertakings in and around the Metropolis. The fact that the Association advertises not only in the London daily papers, which circulate all over the country, but in all the principal Provincial papers, should, I think, be sufficient to dispel such a false conception of the Association's work.

The subscription of 2s. 6d. per million cubic feet sold, or (as Mr. Goodenough put it a few days ago) one penny per consumer per annum, is a small sum to pay for the many advantages offered by the Association.

In spite of the support the Association has received, its manifold activities could be very considerably extended with proportionately greater resulting benefits if the resources at the Committee's disposal were increased. Large sums must still be spent, not only in advertising, but in research work in many directions. It is to be hoped, therefore, that all the undertakings that have not yet joined the movement will reconsider their position, and will recognize the justice of sharing in the expense of conducting a campaign which is not for the good of any particular undertaking, but for the benefit of the gas industry throughout the country.

BUSINESS-BUILDING.

Paper read by R. W. EDWARDS, of Aldershot.

Aldershot and district forms an interesting study, in that, in the wide area under the control of my Company, covering some 120 square miles, is included a wide range of consumer. Roughly, they might be divided into the landed class, the military class, the town class, the rural class, and the working class, each with varying tastes, needs, and desires to be happily met on the one hand, and to be turned into a source of revenue on the other—two equally important issues. Something of the policy adopted it will now be my endeavour to lay before you.

First, and as the basis of all "Business-Building," one can find no better expression than the mis-quotation of Shakespeare, "Sweet are the uses of advertisement." Just as among the giants of the Press, from the historic "Times" down, however admirable the quality of their contents, no medium nowadays can exist without "advertisers," so no gas company can depend solely on its wares for a healthy and go-ahead existence. And a satisfied customer is the best advertiser in the world, and, collectively, more productive than the goose with the golden egg. *Pro rata*, the dissatisfied customer is like the proverbial rotten apple in the barrel.

This may seem a rather strong indictment; but we all know it to be true. The man with a grievance seems to make the "world and his wife" his confidant. I am dealing with a truth that has been heralded from the housetops, but such calls are apt to pass over our heads, and so can bear reiteration. For the bedrock of success in any undertaking, and particularly a gas one, give me the pleased patron. Between belief and knowledge there is a wide gap. We believe and know, to use an Americanism, that

we have "got the goods," and our aim and object in Aldershot and district is to make the populace know it. And it is an aim into which no distinction of persons enters. The slot-consumer in the Company's eyes looms as large as the mansion owner, and a boiling-ring receives equal attention to a battery of gas-boilers. No socialistic inclinations dictate such a line of policy. Whereas the richer sections of the community are rightly *personæ gratæ*, we are apt to forget that it is the pockets of the working man which, in the main, contribute the greater bulk of the vast revenue—not to mention profits—that yearly flow into the coffers of our industry. Such patronage deserves our fullest consideration, and that consideration it has ever been my desire to give. Hence equality of purpose and not the good of one, but the satisfaction of all.

Our Salesmen and Show-Rooms.

As the touchstone to satisfaction we have our salesmen. I use the word in no strict or limited sense. In such a district as ours, so scattered and varying, it is impossible, as in a town, by displays, exhibitions, and otherwise to focus once and for all the attention of the community on the advantages and modern phases of gas practice. Thus the exigencies of the prevalent conditions make Aldershot and district an excellent field for missionary enterprise. To this end the area controlled by the Company has been divided into six separate districts, each with its show-room in the most central and advantageous spot. All of them have been equipped in such a way as to speak for themselves. In short, it has been my desire to make them silent salesmen—ever in the public eye. Thus goods are displayed in such a way that they sell themselves. While actual sales play an important part, the controlling purpose is to show by tastefulness of setting on the one hand, and by practicability on the other, the all-important part gas can play in the modern home, from the highest to the lowest. To the community at large the Company may be but an abstract quantity; in these show-rooms we become concrete, and get in personal touch with the needs of the district. Lady show-room attendants are present specially trained for their duties, and these may be summarily translated into "to give good advice." It is a human temptation that few can resist, and, combined with courtesy, is the firm foundation of the good feeling that constitutes success between buyer and seller. In this connection, I will admit I had initially something of a disinclination to employ female attendants, but results have proved that my prejudices were altogether unfounded, and I have nothing but praise for the service such employees have rendered.

In another direction the various show-rooms constitute so many "ever-open doors" for such complaints as arise in the different districts. To have one's hand on these is like feeling the pulse of a patient; and as all the show-rooms are in direct telephonic communication with the Chief Offiee, if "first aid" is not sufficient in the shape of the District Inspector and his staff, expert assistance is immediately available. In this connection I would note the readiness, on the one hand, of people to talk of their grievances, and, on the other hand, their reluctance generally to write in about them. And as even whispered complaints can echo mighty distances and do excessive damage, then if for no other purpose than that consumers can call in and, to use a colloquialism, "get it off their chest"—offices or show-rooms in the various districts are in my estimation justified. With his headquarters at each show-room there is a District Inspector. Each, in so many words, is the "Manager" of his district, controlling its finance, the fitters, &c., and directly concerned for its general welfare. Each is on its merits—the virtue of both action and self-help are instilled—and increasing custom brings its due reward. The various districts are graded in responsibility and consequent remuneration, and latent keenness and thought with purpose are naturally developed in the human desire for advancement. As it has been well written, "to be a successful missionary requires nerve, not nerves," and the spirit of initiative is given every encouragement. Give a man the due reward for his returns, and you abolish the likelihood of his burying his head, ostrich fashion, in the comfortable sands of "All-goes-well."

Such, in brief, is the constructive policy of our out-districts—individual responsibility, with collective strength, in that all are bonded together in our Chief Office with a Chief Superintendant, daily in touch with the varying requirements of all.

Slot and Ordinary Collectors.

As the next advocates of advancement, we have all our collectors (slot and ordinary). Again, as the result of a particularly scattered district, it is of primary importance, to have, so to speak, "advance agents" with eagle eyes for every fresh opportunity of securing new consumers, and bringing them into the fold. Each is encouraged to look to his laurels in this respect, in that a commission is given for every supply consummated to a new client, or for the landlord's consent to instal slot fittings (comprising, in the first instance, three fixtures and a cooker) in a property not hitherto so equipped. In this connection results show a happy spirit of enterprise and ingenuity.

The collectors also form a valuable vanguard in developing the policy of inside information. As "the gas company man," his entrances and exits from the homes of the community are of vast importance. He hears of the little pin-pricks, the plaints and desires of the householder in the close personal way that is free from any *soupçon* of officialdom. With tact, insight, and patience he can render invaluable service, and give the Company a personal status to render it a real live power in the community. The Company make every effort to instil these laudable qualities, so as to render the periodical visits of the collectors ministrations that leave the essence of good feeling behind. Sales go hand in hand, as the men are picked so as to be able to advise and look after the interests of our patrons. As an additional incentive, for every new gas fire or cooker installed through their agency a bonus is given; so that to show his customers he has their interests at heart, brings its own reward. Experience in the everyday "hurly-burly" amid all types of consumers, develops confidence, and in the result we have a body of men whose minds are not paralyzed by the critical attitude—a most essential feature in those who couple-up the homes of the people with the Company. Thus a continuous campaign, backed by judgment and enthusiasm, is carried on, and the habit of studying and catering for the community becomes a sort of second nature to the men who are the *personnel* of our Company that is conspicuous in the public eye.

Effective Business Control.

As a further keynote to successful business-building, I would emphasize my strong belief in the value of co-ordination. While each district is so equipped as to be able to fight its own corner, yet all are so linked together and so kept in touch that over all is one controlling combined purpose. This is achieved by a system of daily, weekly, and monthly reports which admit of every phase of the Company's work being brought to the notice of our Chief Office. It is only by such a procedure that control can be effectually exercised, and misdirected and spendthrift energy eliminated. With servants, however faithful and energetic, circumstances often arise suddenly which render them incapable, because the course of action demanded lies beyond that prescribed by routine. The Chief Office is ready to advise and to guide. The habit of questioning, examining, and doubting may be common to all—to definitely conclude is a rarer gift. The theory of "responsibility" is left untouched—every District Inspector for himself; and yet behind it all is the assurance of co-operation and backing of a "superman" in the guise of the "Headquarter's Staff." To further link our interests together, monthly meetings of the District Inspectors are held, where in unofficial and friendly discussion the problems and difficulties that arise are fought out, and ideas and activities engendered. Points requiring fuller consideration than that possible at such informal meetings are referred to a committee of chief officers, which also meets monthly, where they are thoroughly thrashed out and definite recommendations made. Ideas are of no use until they are accepted; and the latter committee, while developing questions of its own, acts as a board of censorship on all. Thus a process of assimilation and absorption is ever going on, with results that allow one to indulge in pleasant prophesying. For ideas adopted into every-day practice, suitable rewards are given, and by such means I think we avoid the ever-present danger of "dry rot."

As I have already said, I have the utmost faith in co-ordination along such lines. It is my aim to develop the idea further. I think we can have co-ordination in our actual sales. Particular fittings can co-ordinate and be as one with the particular room in which they are fitted. A gas-fire can co-ordinate with the fireplace in which it is fixed, and be a thing of joy—not an evident replace or makeshift, as it too often is. To my thinking, the National Gas Exhibition in the autumn last year, apart from showing what could be achieved by organization, was a triumph for co-ordination along the lines I speak of. I am sure every one of us when we visited Shepherd's Bush wished a deep wish that we could have had our consumers *en masse* there just to let them see how harmoniously "gas" could be made to fit into this mundane sphere, and increase four-fold its amenities. We have long realized its utilitarian value, but have we awakened quite in regard to its artistic exploitation? Co-ordination demanded the "gas grate" in its tasteful environment, and with its advent has been opened a new sphere of activity. Homes that hitherto looked askance at the gas-fires of old, now know they can be installed not only as a useful adjunct, but, in fact, an added beauty. The same holds true with up-to-date appliances; and right from the scullery to the attic we have the essentials that go to home-making and home-beautifying.

Variety and artistry, combined with efficiency, these should be our aim more and more in an age of wide social reorganization when we can speak so plainly in terms that make for the sum of human happiness. Culture and refinement go hand in hand with the new appliances. This line of thought has been particularly brought home to me by what has befallen in our Camberley district. With Sandhurst and other Military Colleges adjoining, it forms one of the best class residential centres in the South; and many were the prejudices to overcome before we won a right recognition for the artistic way in which gas can solve many of the problems of the modern home. With the advent of our show-room, apathetic indifference has been turned into something like keen interest, and residents can no longer be blind to the obvious in things.

Such are some of the commercial methods, if I might call them so—the ethics of salesmanship—as practised in Aldershot and District.

Controlling Causes of Success.

But the spirit of endeavour, which is ever the soul of progress, cannot end here. If sales are to go up, we must primarily

look to the article we sell. The maximum of success is dependent on three controlling causes—(*a*) quality, (*b*) service, and (*c*) price.

(*a*) In an age when the flat-flame burner is fast becoming a relic of days gone by, and when our position is largely one of purveyors of heat and power rather than light, in the direct sense of the word, it is of paramount importance that the commodity we sell should be of a regular quality. The vast strides that have been made of late years in carbonization all tend towards this goal—a gas of constant composition. At Aldershot, as elsewhere it is our aim, and with the introduction of up-to-date carbonizing plant, the maintenance of an even specific gravity and steady calorific value is well within our grasp. Every out-district has its "Calorgraph" or "Sarco" recording calorimeter, and any deviation from the straight-line value we aim at is immediately notified to the works, and investigation made. Technically and commercially, it is our object to maintain an article of dependable quality, without which assurance the efforts of the best salesmen can be nullified. In this respect, we cannot study our product too closely from the chemical point of view—a standpoint that is too often left in the region of hypothesis when it should be wholly within the practical politics of modern works control.

(*b*) The problem of adequate service was one of the first that faced me in Aldershot. The necessities of a district covering such a wide area, with lines of mains stretching out in different directions to a distance, in several cases, of ten, fifteen, and nearly twenty miles, presented unusual features for solution. I speak of many years back, when we did not mention high-pressure distribution as lightly and easily as now. So it was with something of trepidation, and only after much careful examination, that I embarked on such a scheme. At our works, and at three substations in the out-districts, compressing plants were put down, and the gas boosted on its long journey at varying pressures, according to distance and the needs of the areas supplied. Services throughout districts so supplied are each controlled by service governors, and the success of the scheme has more than amply justified its adoption. Contented consumers and increased sales go hand in hand; and we are in the comforting position of being able to say "the more the merrier," as even to the limits of our fondest hopes there can be no question of an inadequate service.

But adequate service is only half the battle. To put an ancient proverb to a commercial use, "you may bring gas to the consumer, but you cannot make him think." It should be our aim to do his thinking for him. It must have struck all in the analysis of "complaints" received the high percentage that is directly due to "thoughtlessness," and the mole-hill source of many a mountainous charge. A little adjustment of a burner, and all has been well again. Time and again we have met it; and though in the flat-flame days there may have been some excuse for letting things look after themselves, in this age of variety of appliances, and the all-prevailing burner requiring more or less thoughtful treatment, universal maintenance must surely be put in the forefront of our commercial efforts. With our high-pressure scheme in Aldershot town, we have such a system in vogue; and we lay equal emphasis on the minimum of trouble, as well as the maximum of light in our efforts to obtain consumers. Coupled with low cost, the three features make a very effective and compelling advertisement; and the absence of all worry to the consumer is not the least of them. Then, in common with other companies, we have been building up a maintenance staff (since March, 1899), until the system of periodical inspection of incandescent burners ramifies to every corner of our big district, resulting in a general efficiency that was hitherto a very haphazard matter indeed. The advantages are incalculable. Too much emphasis cannot be laid on this "maintenance" side of our work—of which we claim to be an early, if not the earliest, pioneer—as one of the most potent factors in progressive "salesmanship."

Special Features of the District.

As an adjunct of "service," a word or two dealing with what might be described as special features of our district may be of interest. The vast strides that have been made towards the complete conquest of the air will be known to all, but that many of the beautifully-shaped balloons—photographs of which adorn the Press so prominently—are buoyed up by Aldershot gas, may not be equally common knowledge. As the home of the Royal Aircraft Factory, and the headquarters of the Royal Flying Corps, Farnborough may be regarded as the most important centre of aviation in the kingdom. And though it would look as if the aeroplane was to be the war-machine of the air of the future, experiments and trials are ever going ahead with what is known as the airship type of dirigible. For balloon-filling purposes, our North Camp works were in fortunate proximity, and every facility had been extended. Although we have situated there a storage of ample capacity for balloon purposes, so as not to upset district pressures by the sudden pull necessarily involved, I early determined to lay down a special line of main in direct connection with our Ash Road works, and with adequate pumping arrangements in conjunction. Thus on the shortest notice, and without any fluctuation set up otherwise over the district, balloons, &c., can be filled at the rate of 100,000 cubic feet an hour. They are brought right into our North Camp works, where there is suitable space for the purpose, and I need hardly say we do all in our power to meet, by way of storage room, &c., so valuable a consumer in this particular direction as the Government.

Again, and as the result of our special situation in the chief military centre in England, there has been the big question of "Camp Cooking." It has been one that has had a high share of attention with me; and after much worrying and many overtures, some time back the authorities were at last induced to allow experiments to be carried out. But old predilections die hard, and Governments are ever slow to move; and, as yet, no very tangible result has been achieved. At the Royal Aircraft Factory, however, we have got our foot on the threshold. A special line of main was laid, and now all the cooking arrangements in connection with the various dining halls are gas-supplied. It has taken time and effort; just let us hope it will be the thin edge of a very big wedge.

Price the Mainspring.

With these few details I would move on to my final point, that of (*c*) Price. This must ever be the foundation stone of successful "Business-Building," and the mainspring of our appeal. In the manager's eye it must loom largest—so many factors, from the whole system of works' practice to the fine points of distribution, control it.

To begin at the works end. To put it concisely, every economy effected in the cost of gas into the holder, as a sliding-scale Company, ultimately means a *pro rata* reduction in price to the consumer. The field is a wide one, and I can only touch briefly on some of our activities.

Carbonizing costs have ever been the main factor, and here, with the introduction of up-to-date stoking machinery and plant, we have been able to effect a marked reduction in expenses. The whole is electrically-driven; two generating sets having been put down, direct coupled to high-speed vertical gas-engines, with most satisfactory results. Apart from reduced labour charges, there are the equally important advantages of a gas of improved quality and steady composition, and a coke of greatly enhanced value. Additional items are a better quality of tar, and an increased yield of liquid products, all helping towards that reduction in the price of gas we so ardently aim at.

Receipts from Residuals.

As our main stand-by among residuals, I have been seriously studying the coke question. Initially, to deal with the hot coke more efficiently, and while preserving its quality to cut down expenses to a minimum, we are now installing an electric telpherage scheme. But coke satisfactorily disposed of on the storage ground is only a minor step; to have it happily disposed amid consumers is the major one. A sluggish liver can be bettered by pills, a sluggish coke market unfortunately demands more formidable treatment with something of the diagnosis of a specialist. At Aldershot, as elsewhere, we were latterly faced with an increasing stock, and a quiescent, if not actually decreasing, demand. Taking advantage of the cold spell early in the year, we embarked on a wide circularizing campaign, concisely and pointedly emphasizing the many advantages of smokeless fuel. At the same time stocks of coke were garnered at the various show-rooms in our out-districts, agreements entered into with the various retail merchants, and prompt delivery made an outstanding feature, whatever the dimension of the order. To facilitate our operations a steam waggon was purchased; and we are in the happy position to say it has been over-worked rather than under-worked. Indeed, such is my faith in this form of mechanical transport that I hope we may soon have a fleet of like vehicles on the road. While delivery in bulk is most to be wished for, the small consumer's interests have not been neglected. To this end, we have lately instituted the sale of broken coke in 28 lb. lots in paper bags at our various headquarters, and the idea is meeting with an encouraging success. All round, I am inclined to optimism; and if it were only possible to reach that Utopian state of every manager to his own statutory area, the future of coke, I think, need have no qualms for us.

The following figures, I think, are ample ground for optimism:

1914.	January private sales .	Increase over 1913 =	48·9 per cent.
"	" " " by our conveyances . .	Increase over 1913 =	119 "
1914.	February private sales .	Increase over 1913 =	17 "
"	" " " by our conveyances . .	Increase over 1913 =	90 "

Such results speak for themselves.

With sulphate and tar we have been doing similar propaganda work. As regards sulphate of ammonia, in a district so largely agricultural, the advantages of intensive cultivation naturally demand attention. The various Hopgrowers' Associations were approached, and arrangements made whereby the members individually were enabled to obtain supplies of the salt at attractive rates; and though enhanced prices have latterly put a check on this particular line of business, it still proves a very valuable stand-by. Again, so as to cater for the small man, for some years past we have been developing the sale of sulphate in 3 lb. tins. These are available throughout our district, and, with increased enlightenment as to the benefits to be achieved, are finding a ready demand.

With tar, apart from its sale in the usual way, we were not slow to realize the valuable outlet at our very doors in the wide schemes for road improvement consequent to the astonishing growth of mechanical propulsion. We are fortunately placed with so many public authorities, apart from the two County Councils and the War Department having a say as to the area

controlled by the Company. A dehydrating plant was early put down; the various authorities circularized; and a tar with a guarantee as to water content offered with the happiest of results. I have gone into the figures, and find that local sales for 1913 show the striking increase over those of 1911 of 52 per cent., while total sales show an increase of 45 per cent. These figures again speak for themselves.

Such, in brief, are some of our methods of "Business-Building" from the works end; all helping materially toward that reduction in the price of the gas itself which is the ultimate object of all our energies.

Distribution in Relation to Price.

With distribution in relation to price, I have dealt on former occasions in various articles to the Technical Press, and I will not attempt to cover the ground again now. Some years back, when such a policy was in its infancy, I expressed my belief in the value of rebate indicators as an asset to increased business; and I have still good reason to stick to the faith that was in me. The figures I gave at the time were interesting as throwing light on a much debated subject, and will bear re-quoting. In the case of ordinary consumers, twelve instances taken at random from our rental ledgers, on an analysis resulted as follows: For thirty-one gas-fires and four cookers:

Consumption year before rebate operated = 953,600 cubic feet.
Consumption year after rebate operated = 1,417,500 cubic feet.
Overall per cent. increase = 67.

With slot consumers, although we found the gas-fire had not a similar appeal, equally striking results were evident. For four gas fires and twelve cookers, the figures obtained were:

Consumption year before rebate operated = 391,900 cubic feet.
Consumption year after rebate operated = 575,600 cubic feet.
Overall per cent. increase = 68.

The rebate in both cases amounted to 6d. per 1000 cubic feet on gas used for cooking and heating.

The system of differential rates has now been established for some six years, and continues to be a sound and successful policy, especially in developing business in the remoter corners of our district, while the quick settlements that accompany it more than ever enhance its value. Such a policy I know has its limits; and I hope that the day is not far distant when, with low capital costs, high carbonizing efficiency, reduced working charges, and economy in distribution, we will be able to introduce a flat-rate over our whole area of such attractiveness that our *clientèle* will be assured without any such extra inducements. As it is, the use of cookers is happily becoming practically universal; and, apart from the growing demand for gas for industrial purposes generally, I think we must look to the gas-fire for that continued increase in consumption it is our ambition to maintain. Every manager has his own pet theory, and many are the lures to their adoption. Yet in how many homes is the gas-fire still just the stand-by, not the convenience in regular use. We want to get out of the drawing-room into the living-room, to put it briefly. Old sentiments die hard, and the coal-fire is one of them. But now that the medical profession has given the cachet of its approval, and architects and manufacturers have come into artistic co-partnership, prejudices are fast fading into the *ewigkeit*, and the gas-fire is coming into its own. Once there, we want to keep it there, and with the economies of modern gas practice predominating the flat-rates we hope to introduce will achieve that end.

Conclusion.

Such are some of my thoughts, principles, and practice in outline. If I have been able to present them in a way to stir up something of thought, and more, I would venture, of that criticism that enlightens, then my purpose in presenting this paper has been more than amply served. Business system is a sensitive machine which requires constant and careful attention, with periodical overhauling, for—

"Our little systems have their day,
They have their day and cease to be."

Consequently we must ever have our eyes and minds directed to the future with a ready appreciation of its needs and requirements. Be bold, yet cautious. It is equally a mistake to be too much in front of the time as behind; consequently the conclusion is to direct our aims to a true knowledge of the requirements of a fastidious, but appreciative public, coupled with that *sine quâ non*, "Perfect Service." Thus will "Business-Building" be a pleasure and a success.

There are many points I should have much desired to include in this paper; but unfortunately the request (the honour of which I appreciate) to prepare something for your consideration came at a time when I was very pressed with many other matters of business. Nevertheless, with the loyal help of my esteemed Chief Assistant, Mr. C. M. Wilson, and Chief Clerk, Mr. H. Barton, my task has been rendered lighter, and I trust sufficiently attractive to secure your interest to-day.

Secretaryship of the North British Association of Gas Managers.—At the last meeting of the Committee of the North British Association of Gas Managers, Mr. Peter B. Watson, of the Wishaw Gas-Works, was elected to succeed Mr. Lawrence Hislop as Secretary and Treasurer.

PRESENT DAY REQUIREMENTS FOR GAS CONSUMERS.

By W. B. Farquhar, of Ilford.

[A Paper read before the Eastern Counties Gas Managers' Association, April 24.]

As no doubt you are aware, the Company which I have the privilege to serve supplies light, heat, and power to the urban district of Ilford; and as this is a suburb of London within easy reach of the City, the district has increased very rapidly. The continued building of new houses and the large increase in the number of new consumers have made the outdoor department not only a very important branch of our undertaking, but also a very busy one.

It is when dealing with matters relating to the outdoor department that the thought has often come into my mind as to whether we are doing everything necessary to meet the requirements of consumers. My thoughts have carried me even further, and applied this same question to the business of gas companies generally. The question is a very important one, and one which makes all the difference to the prosperity of a gas company. While the general business carried on by gas companies may be very similar, each company has its own particular method of working; the difference being brought about not only because some companies are more progressive than others, or are in a better position to deal with their consumers, but also to the fact that the class and character differ to a considerable extent in each district. I have no doubt that every manager present to-day is giving good attention to his outdoor business, and we may all be under the impression that what is being done is sufficient for all practical purposes. Yet it is possible that many of us may be lacking in some directions, and particularly where a little development and extension along certain lines might be the means of bringing in a very good return for a very little expenditure. The fact that we have an article to sell must not be lost sight of; and it is our duty to see that our consumers are made aware of the many methods by which our commodity can be made to act as their very useful servant. It is unreasonable to expect the consumer to know of the many methods of using gas; and unless the appliances are brought to his notice, he remains ignorant of their existence.

In towns where the gas company is faced with a strong electric competition, either in the nature of a council undertaking or a private company, it is very necessary to do all in one's power to keep consumers satisfied, and also at the same time to promote the greater use of gas in other directions than lighting purposes only. Where the gas manager is in the fortunate position of being free from electric competition, it does not follow that he should be in any way behind in his endeavour to work his outdoor business to its fullest extent. Towns and districts having no electricity to-day may have it to-morrow; and the stronger the hold the gas company has on its consumers and the greater the satisfaction they give them, the easier it will be to retain them should the competition come along. Do not wait until you are faced with the competition. What is good and necessary for consumers in large towns where competition is keen is also good and necessary for them in smaller towns, even though there be no competition. Do not let it be said by the public after electricity has got a hold that it has been the means of waking you up, and whereas before we could not get this thing or that thing, or proper attention to our complaints, we now get full attention and everything required is attended to at once. My advice is: Get there first, and do everything needful, so that none can say that you were forced into doing what is after all merely your duty to your consumers.

As already stated the general requirements of gas companies are to some extent similar; the only difference being in the carrying out of these requirements. It is to try and compare each others methods of working that I have introduced this subject to-day. This short paper is, therefore, principally to give you a brief outline of our system of working at Ilford, and is not only given with the hope that it will be of interest to everyone present, but that it will bring forth a general expression of opinion and discussion as to what you yourselves are doing, so that the result may be of mutual advantage to each other, and possibly direct some of us into new channels whereby we may increase our gas consumption.

I have no doubt that you have all experienced more or less the difficulty of approaching consumers in certain matters; this being particularly so in pushing gas appliances where the hiring rates are high. The charging of rents has always been a very sore point with gas consumers, and you can readily see why this is so. A consumer usually looks upon the article which he is using as an apparatus through which he is giving the gas company custom, and therefore considers that if he burns the gas he ought to have the means placed at his disposal to do so free of charge, or at least at a very moderate figure. I cannot at the moment agree that companies can or ought to supply these appliances free, but it certainly is the policy to make the charge as low as possible. I have often turned over in my mind the question as to whether a reduction in the price of gas is of greater advantage to the consumer than affording him greater facilities for using the gas in the way of cheaper hiring rates, and also by greater attention to his requirements. I would say that, where the gas is expensive, get

the price down as low as possible; but where gas is supplied at a reasonable figure, I do not think a penny reduction in price is of the same benefit to either the consumer or the company as where this difference in value is given in increasing the use of gas on the district. The old saying that the profits are made in the retort-house still holds good; but these profits are to a large extent increased or decreased according to the manner in which the outdoor business is conducted. Dissatisfied consumers mean not only decreased consumption, but also possible loss of the consumers altogether. On the other hand, satisfied consumers mean increased consumption; and if, besides satisfying the consumers with gas for ordinary lighting purposes, you can get them to utilize gas cookers, fires, irons, geysers, coppers, water circulators, &c., you not only have increased consumption, but what is even more important you get an increase per meter.

The question of increasing the consumption per meter is an exceedingly sound one. If you take the case of a gas company having to extend any part of its works, no matter whether it is in the nature of retort-settings, exhausters, purifiers, or mains, it is customary to put down plant of such a size that it will meet the requirements for some time to come. In other words, it is put in larger than is required at the moment. It is, however, not until the increase in the gas used is sufficient to work any of these pieces of apparatus to their fullest extent that you are getting the best return out of the capital expended. This same point holds good in the case of house supplies. A house where the consumer is only using gas for lighting purposes requires almost the same amount of fitting up as a neighbouring house of similar size where the consumer uses gas for lighting, cooking, heating, ironing, and possibly a gas copper. The meter and service are common to both houses as well as the ordinary piping; the only addition being a few short lengths of pipe to connect the cooker, fires, and copper. The outlay for these minor additions is very small as compared with the extra consumption obtained.

District Supervision.

The area covered by the Ilford Gas Company is a very compact one, and the number of consumers at the end of 1913 was 15,165. The district is divided in two parts, each division being supervised by an inspector. These inspectors in their turn are under the Chief Inspector, who supervises the whole district generally. There is also a foreman fitter or (to give him a better name) a superintendent fitter, whose duty it is to pay visits to houses where the gas-fitters are at work and see that the work is carried out in a proper manner, and that gas fires and cookers are left properly adjusted for use. Complaints from the district are dealt with in the office each morning, and are classed as ordinary, special, and extra-special complaints. With regard to the first-named complaints, these go through the ordinary routine of the office books, and are booked-out to the respective fitters to be dealt with in the usual way. The special complaints are put into the hands of the inspectors, each one having his own district as stated above, and who give these complaints their special attention. Classed under these special complaints are the fixing of geysers, water-circulators, special fires and cookers, attention to disputed accounts, and investigation regarding any repeated complaints of the same kind from the same consumers, &c. The extra-special complaints are as a rule dealt with by the Chief Inspector. These complaints are in connection with disputed accounts, which the assistant inspectors have not been able to settle, inquiries *re* shop lighting, and other matters requiring any extra attention.

I might mention that we have a staff of maintenance men, whose special duty is to visit the houses and shops on their lists and keep the burners in order. The maintenance charge is 7d. per burner per quarter. In the case of shops, the man is supposed to call once a week, and in the case of private houses once every two weeks. Public houses and special shops are visited more frequently, as the hours of burning are much longer than is the case with the ordinary shops. In one or two cases special rates have been arranged where the shopkeeper has three-light or four-light inverted lamps in use. Most of these lamps have individual taps to each burner; and this enables the shopkeeper to use one, two, or three burners as required.

Hiring of Gas-Cookers.

The Company hire-out gas cookers, fires, water-circulators, gas-coppers, and lamps. In hiring-out these articles, we have restricted our hiring list to certain sizes and types of appliances. This I think is a very good policy, as the parts required to be kept for renewal are greatly reduced. You will realize that a company hiring-out all makes and sizes of (say) cookers and fires will need to keep in stock such a quantity of different kinds of burners, top-bars, grill-plates, fuel, &c., that it will greatly increase the amount of space required for storing. Besides many of the articles may never be required, and will thus become dead-stock. The question as to how many firms a company can deal with for articles of the same kind to be placed on hire depends solely upon the size of the company; larger companies, of course, being able to hire-out practically every make of gas appliances suitable for placing on their district. A year or two ago we only had one firm on our hiring list of cookers, and hired-out a high-grade cooker in three sizes, a second-grade cooker, and a slot cooker, making five in all. It was felt that as the Company was growing and the district increasing, additional cookers could with advantage be added to the number, and so it was decided to place another firm on our hiring list. The position to-day is that we have eight different cookers on hire; and we have replaced the unpacked slot cooker with a better class packed cooker. Counting the slot cooker, we therefore have a total of nine. The hiring rates for cookers range from 1s. 6d. to 3s. per quarter; and they are fixed free in each case. These cookers are also sold to consumers for cash, and placed on hire-purchase on favourable terms. As an illustration of our hire-purchase rates, I will take a cooker costing the Company £2 8s. 6d.; this being the cooker which we let on hire at 1s. 6d. per quarter. The hire-purchase rate for this is 4s. 8d. per quarter spread over three years. In other words, twelve payments of 4s. 8d. make the cooker the property of the consumer.

Cooker forms are signed by the consumer. These are kept at the office and properly filed, so that they can be referred to at any time. In the event of a consumer making an application for a change of cooker, this change is made without charge provided the cooker has been in use six years or over. In the event of the cooker having been in use under this time, and should the tenant desire to change from a smaller cooker to a larger size, a charge of 2s. 6d. is made. For changing to the same size or smaller, the charge is 5s. Should the consumer make a complaint with regard to a cooker, the inspector calls; and if he considers that the complaint is justified, it is changed free of charge, no matter what length of time the cooker has been in use. The cookers are kept in repair free of charge except where wilful damage or an accident takes place. In this case a small charge is made for the replacements. In fixing the sale price of cookers, we have based the figure on the cost price; the sale price being the cost of the cooker to the company, *plus* 5 per cent. The hire-purchase price is the sale price *plus* 15 per cent. in twelve equal quarterly instalments. We have numerous instances of consumers desiring to purchase the cookers which they have on hire; and as the length of time the cooker has been in use varies considerably, a scale has been made out to meet these cases, which is adhered to if possible. There are, of course, exceptional instances where the scale is not strictly carried out.

Cooker Plate Racks.

A useful addition has been made to cookers in the nature of a plate rack and back. We have adopted a particular type of plate rack and back; and these are let out on hire at 4d. per quarter. If any manager present has not yet adopted the sale or hire of these plate racks and backs, I strongly recommend him to consider the matter, as the advantage to the consumer is considerable. This is borne out by general expressions of opinion, and also by the exceptional demand we have had for these articles; the demand being so great that we have found much difficulty in getting the goods from the makers.

Grillers, boiling-rings, and hot-plates are only supplied for cash, as we do not find a great demand for these articles. It is our policy as far as possible to get cookers fixed, as in my opinion the consumer is more satisfied with a cooker than with a griller or boiling-ring. Boiling-rings, however, are sometimes supplied to the slot consumers in place of the slot-cooker should it be preferred. There is no alteration made in the slot arrangement; the only difference being that the ring is substituted for the cooker.

Gas-Fires.

Gas-fires come next to cookers in point of numbers; and during the past few years a considerable amount of business has been done with these articles. I am pleased to say that the general improvements made by the manufacturers in fires have made it possible to advocate the use of these without fear of any trouble or request to remove them later on. The fires are let on hire at rents ranging from 5s. to 10s. per annum. The first annual payment is made in advance, at the time of signing the usual agreement; the subsequent rents being paid at Michaelmas and Christmas only. No charge is made during the summer months. This method of charging is, I consider, an excellent one, and one which we have found to work-out exceedingly well. During the Michaelmas and Christmas quarters the fire is more or less in use, and the consumer has, therefore, no objection to paying the hire of it. If, however, the charge is spread over the four quarters, the consumer feels that he is paying rent during the summer quarters for something which he is not using, and this might induce him to get rid of the fire in the spring of the year. As, however, no charge is made during the summer, there is no object in him sending the fire back. The price charged for hired fires includes the fixing, and piping up to 15 feet is provided. Any piping over this is charged at 5d. per foot. No charge is made for changing fires; but in nearly every instance where the question of changing is raised, it is customary for the inspector to call and ascertain why the change is desired. Should it be to the advantage of either the Company or the consumer to remove the fire and replace it with a different type, this is done. Gas-fires are also kept in repair free of charge. It is essential in fixing gas-fires to see that the fire selected is suitable for the room in which it is to be fixed; and this rule is very carefully watched. An inspection is made of the house before the fire is sent out. Gas-fires are not only hired but are sold outright, and also on hire-purchase—the prices being kept down as low as possible.

Gas-Coppers.

The Company also does considerable business in gas-coppers. We have a particular type of copper called the "Ilford," which is let out on hire at 2s. per quarter with cast-iron pan, and 3s. per

quarter with copper pan. As, however, it is of rather a better quality, the demand for direct purchase is not so good as for the cheaper types, which we also supply for cash. We have successfully induced one or two local builders to go in for gas-coppers in place of the ordinary type of copper; and I believe that the tenants are highly delighted with them. It would appear that we are getting the builders to realize the advantages of fitting gas-coppers in place of the ordinary built-in type; and I am looking forward to a considerable business in the future in this particular line. Coppers are fixed free, but a small charge is made for fixing a flue-pipe.

Water Circulators and Geysers.

With regard to water-circulators, we have one type on hire; the price being 4s. 3d. per quarter if fitted with a thermostat, and 3s. 6d. per quarter if without one. This is also on our selling list, and also on the hire-purchase list. As the position in which the circulators have to be fixed varies considerably, we always give an estimate for fixing them. I regret to say that so far we have not had a great demand for hot-water circulators; this possibly being due to the high rates at which they have to be charged. The particular type which we have on hire at the moment is rather expensive; but as there are cheaper types now being placed on the market, no doubt we will be able to considerably reduce our hiring rates.

At the present time we do not hire-out geysers; but they are placed on favourable terms both for sale and hire-purchase. As the cost of fixing geysers depends upon the position of them and the amount of water-piping required, an estimate of the cost of fixing is submitted, which is paid by the consumer. The gas-pipe is supplied and fixed free. Our general output so far has been good, notwithstanding the fact that we only supply these on sale and hire-purchase. If we can get these placed on favourable hire terms, I feel confident that a considerable amount of business can be done. It is my intention to go into the question of hire at an early date, and have geysers placed on the same footing as the other appliances.

Services and Meters.

Respecting services to houses and shops, the usual size is ¾ inch for the ordinary sized house and 1 inch and upwards for shops according to size of same. In years past services were put in with ordinary gas-barrel; but we have now adopted a system of putting in all services with steam-pipe. The extra cost is I think more than repaid by the fact that you know that you have a sound service, and an extra length of life as against the gas-barrel. Records are kept of all services laid; and the usual notices as to opening the roads are sent to the local council, as no doubt is the case in your own districts.

Upon the completion of the ordinary meter form a meter is fixed in the house, provided that the service is reported as being laid. A fixing charge is made according to the size of the meter; this being prepaid and not returnable. Meter rents are charged —*i.e.*, 1s. 3d. per quarter for a 5-light, 2s. for a 10-light, 3s. for a 20-light, 4s. for a 30-light, and 6s. for a 50-light. Consumers are entitled to purchase their own meter if they so desire; but it is usual for the Company to test these before having them fixed. Consumers may also purchase the meter which they have in their houses; but the Company will not sell a meter which is more than five years old. Complaints regarding wrong registration of meters are given special attention; being first inspected by one of the inspectors, and if it is not considered satisfactory the meter is changed and tested at the works. Should the consumer not be satisfied with our test, he has the option of having the meter officially tested by the London County Council, and a certificate of test obtained. Should the test prove that the meter is correct, the 5s. which we have previously received from the consumer is forfeited. If, on the other hand, the test bears out the contention of the consumer and is found to be defective, the 5s. is returned. Automatic meters are fixed free of charge, and no rent is charged for them. The Company has two kinds of slot meters—*i.e.*, ordinary slot meters and full slots. In the case of the ordinary slot, this is set to pass more gas than the full slot, but it does not carry any advantage except that the consumer is able to pay for his gas as he consumes it. A full slot is set at less than an ordinary slot, and carries with it the use of fittings, piping, and slot-cooker free of charge. In the case of the ordinary slots the consumer has to pay rent for his cooker, and the fittings have to be provided by himself.

Since fixing the rate of our slot meters, we have reduced the price of gas two or three times; but instead of altering the rate of the meters, a rebate is given, and this has been increased each time a reduction has been made in the price. In some few instances this might not suit the consumers, but it appears to work admirably in our district, as the consumer is very well satisfied when he receives back a fair proportion of the money in the box.

Gas-Lamps.

With reference to gas-lamps, up to a year or two ago lamps were only fixed if purchased by the consumer. But to meet the exceptional competition with the electric light, it was decided to place lamps on hire for outside shop lighting; and since the system was adopted we have done exceedingly good business in this line. After considerable experimenting and trials, we decided to adopt a three-light inverted lamp; and as is the case with the other articles we let on hire, we have restricted ourselves to one or two makes of lamps. We have four types of lamps on hire; and the charge for them is 5s. per quarter, payable in advance. This charge includes free maintenance and attention; the gas, of course, being paid for by the consumer through his meter. In fixing a lamp an estimate is given of the cost to be paid by the consumer. I might here mention that, acting on a suggestion made by my Chief Inspector, we had a number of mantles made slightly longer than the ordinary inverted mantles. We have found that these mantles give an improved light, and the lamp when lit generally has a better appearance than when fitted with the smaller mantles. To get these larger mantles quite full, it required just a shade more gas per lamp, but the difference in gas consumption is more than compensated by the increased light obtained.

With regard to high-pressure lighting I need hardly say anything on this subject, as I have already given you particulars of our system at Ilford. I might, however, mention that when I read my paper on this subject in September, 1911, we had in use

18	600-candle	power	lamps	
74	1000	,,	,,	,,
8	1500	,,	,,	,,
4	600	,,	,,	,, on 10 inches pressure.

This number has been increased, and at the present time we have in use

37	600-candle	power	lamps
184	1000	,,	,,
22	1500	,,	,,

You will notice that the four 600-candle power lamps on 10 inches pressure have been removed, having been replaced by the newer type.

Other Business.

Besides the foregoing articles, the Company deal extensively in pendants, brackets, hall lamps, gas-irons, burners, mantles, shades, &c., all of which are supplied on favourable terms. The selling prices of the pendants, mantles, burners, &c., all cover the cost of fixing. By adopting this system the consumer knows exactly what he has to pay, as there is no after-charge.

With regard to the carcasing of houses, the majority of the houses in Ilford are built by speculative builders; and as we prefer carcasing houses ourselves rather than allowing builders to do so, we have cut our prices very keen indeed. At present our quotation for carcasing houses is £1 per house. This price includes the running of thirteen or fourteen points, as well as the supplies for gas fires, cooker, geyser, copper, &c. This figure had to be cut down, otherwise the builders would put in their own piping; and as the builders have no interest in the houses after they are sold, they naturally only put in piping of sufficient size for the immediate requirements for lighting. The Company has therefore often to run a new inside service should the tenants at a future date require gas-fires in any of the upstairs rooms. It is therefore much better for the Company to do the work in the first instance, and see that the piping is put in sufficiently large to meet all requirements. Although originally it is done at a slight loss, it pays in the long run.

I might add that I do not claim that our hiring rates are all ideal; but as occasion arises I hope to deal with each one, and gradually bring them down to as low a figure as possible. Everything must have a beginning. It is wise to start on the high side and reduce the price as you go along, rather than commence too low down the scale and then have to increase them.

DISCUSSION.

Mr. A. E. Broadberry (Tottenham) said that the methods that Mr. Farquhar had adopted at Ilford were so nearly like those they had applied at Tottenham that it was difficult for him to criticize anything the author was doing without criticizing the system of his own Company. He quite agreed with Mr. Farquhar that in those cases where electrical competition was coming along, it was wise to start early to place facilities before consumers in the matter of fitting up shops and houses adequately for the use of gas not only for heating and cooking, but for lighting. This was done at Tottenham. The electricians were very late starting competition in the district; and when they knew the competition coming along, they adopted the very lines that Mr. Farquhar now recommended, with the result that the consumers spent thousands of pounds in lamps, and also took on hire from the Company a good many more thousands of pounds worth of gas lamps and fittings. Having spent their money on gas, the users were very loth to discard it for the less useful illuminant, electricity. He must, however, be careful what he now said about electricity, because his Company had become electricity suppliers. He had therefore now to advocate electricity as well as gas. [Laughter.] In one thing he did not agree with Mr. Farquhar. In one place in the paper, it was said that the consumers rather resented paying rentals for goods on hire. At Tottenham they had not found this. On the contrary, they found that the consumers welcomed the opportunity of hiring almost anything, because, having hired the appliances, they felt that, if there were any improvements made at any time, they could turn the appliances back on the gas company, and so were not at a loss. Though improvements did take place—and they took place rapidly nowadays—they found that nearly all the appliances that were out on hire remained out on hire for many years. In fact, it would interest some of the members to know that, taking gas-meters, fittings, lamps, gas-engines, cookers, fires, and various other appliances that were out on hire in their district, the rentals amounted to a sufficient sum to pay not only the dividend but the

interest on the debentures, and more than paid these things; so that at Tottenham the Company were in the fortunate position of being absolutely independent of any profit on the gas itself. He strongly recommended the members, as Mr. Farquhar had done, to adopt similar lines, because he was sure it would pay, and give satisfaction. There was as much money in it as there was for furniture-hiring firms; and it was known what a fine business the latter did in that particular way. The rates of hire on which Mr. Farquhar had based his rentals were paying ones; and he (Mr. Broadberry) was sure that the experience at Ilford would, before long, be the same as theirs at Tottenham—they would also be paying their dividends out of the rentals. Towards the end of the paper, it was stated that the Ilford Company dealt extensively in pendants, brackets, hall-lamps, gas-irons, burners, mantles, shades, and other things. He (Mr. Broadberry) believed the time would come when these would also be let out on hire; and that the author would find the consumers would welcome anything that he did in this direction. He certainly thought Mr. Farquhar was wise in standardizing all the appliances that he let out on hire, because, as he said, it saved keeping an unnecessary lot of spare parts. Mr. Farquhar mentioned that the water circulators he had in use were somewhat expensive. But there was a cheaper one coming on to the market at the present time. He had just received a very good circulator (but had not yet had time to test it) of American manufacture; and although some of the English firms might think it was quite wrong for British gas suppliers to go to America for goods, he (Mr. Broadberry) thought they might perhaps learn something from their friends across the Atlantic in the way of efficient and cheap construction. He hoped that English firms would copy their example, and let gas companies have circulators at the same price as this one, which he could assure those present was a very low figure. In regard to this, he should like to mention one thing that an old official of the Tottenham Company years ago said to him, when they were launching out into the hiring system. This old official (like Mr. Farquhar) came from North of the Tweed; and he was a far-seeing man. He said, when they started letting cookers out on hire: "What is all this fuss you are making about letting these things out on hire? It is only for the benefit of the consumer, and the gas-stove makers. You are going to make business for the stove makers." To a large extent he was correct; and now he (Mr. Broadberry) thought the time had come when the gas-stove makers ought to produce something a little bit cheaper, so that the companies could reduce their rates, and still further extend the beneficial hiring of gas appliances.

Mr. R. G. SHADBOLT (Grantham) thought that Mr. Broadberry had opened the discussion in a business-like manner; but the results he had given as to the hiring of appliances were rather startling to him (Mr. Shadbolt), judging from his own experience of this kind of business. He dared say there would be others in the room who would be astounded to find it was possible for a gas company to earn their dividend and interest from the hiring out of apparatus alone. His experience in the general supply of a Lincolnshire town was that the tendency was in the direction of cheapening the gas service generally; and instead of looking to rentals from any kind of apparatus as a source of profit, to get the profits from the gas consumed through the appliances. To his mind, the question they had to consider was what could they afford to do as a business transaction, and at the same time give satisfaction to consumers, and increase the consumption of gas, looking to the profit made on the gas to pay not only the dividend, but any loss incurred in letting out on hire the apparatus that consumers might require. It was becoming a question with him not how far they would have to go (one could see the indications of that clearly enough), but what was the greatest step they could afford to take at a time in reducing rentals and increasing free service of all kinds, which would appear to be in the opposite direction to that which Mr. Broadberry had taken. A few figures might prove of interest. Mr. Farquhar charged meter-rents. Twenty years ago in his (Mr. Shadbolt's) own town meter-rents were abolished. This was a charge against revenue account, and a charge on the gas, which the consumer had to meet. Then there was fitting, and by "fitting" he meant repairs and renewals of parts of cookers, fires, and all kinds of things out on hire, which was in addition to the actual fitting work. Cookers and fires must also be heavily depreciated. With regard to meters, he took 10 per cent. on their value. These various items amounted for his Company to the alarming sum of £2500 a year, taking the figures of 1913. Dividing this by the total number of meter consumers, and ignoring the public lighting, it ran out to a little over 10s. per consumer a year in service rendered. Or putting it another way, it totalled to over 6d. per 1000 cubic feet of gas. Were all these various services paid for, they could reduce the price of gas 6d. per 1000 cubic feet. This was the tendency in his own particular case; and it was a tendency that was not an uncommon one. They now asked themselves whether there was anything more they could do "free" to benefit the consumer, and give themselves a greater sense of security. Of course, it was not really "free" service, because it had to be paid for one way or the other. In regard to maintenance, they charged nominally 6d. per burner. In cases they had to take considerably less, according to conditions; and when it was a matter of the credit of the Company, and the consumer was cute enough to see that, then they had in some cases to do maintenance for nothing. Generally speaking, he would say that in his own experience the tendency was summed up in the two words "Public Service." He was rather struck by one passage in Mr. Farquhar's paper: "I would say that where the gas is expensive, get the price down as low as possible; but where gas is supplied at a reasonable figure, I do not think a penny reduction in price is of the same benefit to either the consumer or the company as where the difference in value is given in increasing the use of gas on the district." The question was simply which it would pay best to do, and which would give the greatest satisfaction to the consumer, and the best service. In one case it might be the one plan, and in another case the other. With regard to the rates that should be charged for the rental of apparatus, this again was a matter for local conditions. Referring once more to his own experience at Grantham, they sought to touch the popular fancy with reference to cookers. In the first place, they fixed them free up to 30 feet of piping, and charged rent on the basis of 10 per cent. They had a certain influx of orders. Then the orders practically ceased. The rents were then reduced by half, and were now on the basis of 5 per cent.; and they had gone up in their connections until they had literally saturated the district. Taking an inventory of the grillers, boiling rings, and cookers into account, there were only 80 gas consumers who had not one or other of these appliances. So the Company had had to come down until they touched the minor requirements. Had they reduced the price of gas to these particular apparatus, and retained the rental at the original figure, the probability is that they would still have been short of many of these appliances that were in existence and in use to-day. One word with respect to geysers and circulators. In his own case, he had not been able to get a single water-circulator in use under any conditions or terms; but geysers went like shelling peas. The Company did not let the geysers on hire. They simply fixed them at net cost. They had touched the public idea of what the requirements really were; and they had fostered it. Geysers, circulators, outdoor lamps, and things of this kind, one could see, on the basis he had had to go on lately, were a greatly increased tax on the revenue account, if they were placed on the hire system. The reference to the carcasing of houses was an index as to the direction in which they were going—that was, in doing things that were not in themselves remunerative. Why did Mr. Farquhar do carcasing at £1 a house? It could not be done profitably at the price. It was simply because it was the best thing to do. The question was how far this kind of thing could go on, and what was the greatest tax the price of gas could obtain under the particular conditions. So long as they could give satisfaction to the consumers, so long would they retain their favour, in spite of competition, and not always fair comments on the part of their competitors. It certainly seemed rather strange to him that, taking the two different methods of dealing with the hiring-out business, they should have achieved success in both directions in regard to their public communities.

Mr. FARQUHAR, in reply, said Mr. Broadberry had stated that he did not find any difficulty in getting the consumers to pay high hiring rates. As a matter of fact they had not found any great difficulty at Ilford with the rates charged. He was afraid that two different meanings had been placed upon one point of the paper—namely, the paragraph respecting the difficulty of approaching consumers particularly in pushing gas appliances where hiring rates were high. Mr. Broadberry had been dealing with the matter from the point of view that the consumers welcomed hiring because it gave them the option of hiring as against having to purchase the appliances; while on the other hand the question had also been considered from the point of hiring rentals *v.* free loan of the appliances. As Mr. Shadbolt had remarked, it just resolved itself into a question as to where they were to get their money from. If they were going to lend the appliances free, they must make the money out of the gas; while if they were going to give people cheap gas, they must have, anyway, a little hiring rate. His own view was this, if they made the gas too dear people would not consume it. If they gave the people reasonable hire rates, they would get a little more out of them; but, after all, it was a question of hitting the happy medium. He thanked Mr. Broadberry and Mr. Shadbolt for their criticism of the paper; and he was glad to hear the Ilford Company were on the same lines as the Tottenham Company, because the latter were very progressive. If they were going on the same lines as Tottenham, they were not going far wrong. Mr. Broadberry told them that his Company were paying all their interest and dividends out of the rents; but he thought the Tottenham Company were favoured with a very low capital account, which helped a great deal. Mr. Shadbolt had referred to the question of Rents *v.* Price of Gas. Choice again really depended upon which was going to be the best plan for the particular district in question. They must have a certain amount of money with which to run the concern. As already mentioned, if they did not get the money out of the appliances in the shape of rent, they must get it out of the gas supplied. As Mr. Shadbolt said, it was just a case of balancing the two. If one had a penny per 1000 cubic feet to spare which could be used for reducing the price of gas, and it was found that the penny could be better spent on the district, that would be the right course to take. One company might with the penny reduce the price of gas, while another might spend it on the district. Both, under their particular circumstances, might be quite right. Mr. Shadbolt had asked why circulators were on hire and not geysers. His Company were doing very well with the geysers on the hire-purchase system. At one time, he did not anticipate putting geysers on hire, because he thought

they would give a good deal of trouble, and the expense of repair would be heavy. As he had said in the paper, he was going to take up the question again. The circulator had come along later, and this they had put on hire; but they had deferred consideration of the question of hiring-out geysers. He was now going to take this up. He found that the consumers really preferred the geyser to the circulator. The geyser gave the exact amount of water required for the bath, unless it was one of the bigger and higher-priced ones which supplied not only the bath, but the scullery as well. On the other hand, with a circulator the user had to heat up the boiler and all the water in the tank, and yet only half of it might be required. The result was that the other half of the water was allowed to get cold, and that was a loss of heat, and therefore of gas. He thought this was a drawback from the consumer's point of view, and also a drawback to getting the circulators fixed. With regard to the hiring and hire purchase arrangements, his Company had various forms which they got the consumer to fill up. It would be noticed that the forms were printed on different coloured papers; and by adopting a different colour for each article, the clerk could put his hand on any one in a minute. If any gas engineer would like to have more details as to their prices or hiring arrangements, and would write to him, he would be pleased to send copies of the agreement forms and full particulars.

TRANSLUCENT MARBLE FOR LAMPS.

A method of polishing and impregnating marble which imparts to it great transparency has been invented by Herr H. W. Engel; and pieces of it, from 0·1 to 0·8 inch thick, can, it is claimed, be employed for lamps, instead of opaline glass. Some experiments carried out by Herr Voege are described in the "Elektrotechnische Zeitschrift" for the 19th of February last. They were made on pieces of this prepared marble 0·14 inch thick, compared with ground and opaline glass thick enough to make the filament of an incandescent lamp indistinguishable through them. Reckoning the transparency of marble to luminous rays as 100, that of opaline glass is 56 to 80, and of ground glass 300. Marble allows fewer of the yellow rays to pass than does opaline glass, but more red and still more blue rays. When a piece of prepared marble and another of opaline glass lighted by transparency are simultaneously before the eyes, the former is more regularly illumined, and has a violet-red tint pleasing to the eye, whereas the latter seems greenish and likewise dull and dirty. From the point of view of diffusion of light, marble and opaline glass are on a par; but ground glass is greatly inferior to both. If a pencil is placed between the lamp and the pieces of marble and glass, the shadow is less distinct through marble than through opaline glass.

Herr Voege first illuminated his laboratory by means of transparent and ground glass incandescent lamps fixed on a chandelier and brackets respectively, and then by a very powerful lamp, the glass of which could be replaced by transparent marble, suspended in the centre of the room. With an equal consumption of energy, the lighting was greater and more uniformly distributed by the marble lantern. He next studied the transparency of marble to invisible rays, and found it to be the same with marble and opaline glass for ultra-violet rays. The former is very slightly transparent to calorific (infra-red) rays, considerably less so than opaline glass, and even less than a sheet of water 0·4 inch deep, which, however, is considered as being an excellent screen for calorific rays. Basing his opinion upon the works of various oculists, Herr Voege ascribes the agreeable character of the light diffused by the marble to the absence of calorific rays, which disturb the eye.

Last Year's Coal Output.—The Home Office have issued preliminary figures showing that the output of coal from mines in the United Kingdom under the Coal Mines Act, which was 260,398,578 tons in 1912, rose last year to 287,411,869 tons. This is an increase of 27,013,291 tons, and constitutes a record. The number of persons employed at these mines was 1,127,890, which was an increase of 38,300 on the previous year.

Improved Lighting in Manchester.—The activities of the "Better Manchester Committee" which has recently sprung into existence have led to several improvements in civic affairs. As an experiment, the whole of Grey Mare Lane, connecting Ashton New Road with Ashton Old Road, is to be illuminated by 52 overhead gas-lamps of Sugg's Littleton type, to be affixed to the electric standards. This will, of course, mean the removal of the existing lamp-posts—a factor which has led to the suggestion that trees should be planted in their place.

Formation of "Black" Salts of Ammonia.—In the "JOURNAL" for the 14th inst. (p. 108), we gave an abstract translation of an article on the above-named subject by Heer J. Van der Bossche, which had appeared in "Le Chimiste." In a communication we have received from the author, he says he is doubtful as to the words "black salts" conveying to the reader the same impression as the French words "*sels noirs*," which are applied to objectionable grey as well as to really black salts. Therefore salt which is not a "good grey" would be called in French a "*sel noir*;" and it is in fact to salt of the character indicated that the remarks in the article refer.

THE TREATMENT OF THE PREPAYMENT CONSUMER.

By JOHN CARTER, of Lincoln.

[A Paper read before the Eastern Counties Gas Managers' Association, April 24.]

When I acceded to the request of our Honorary Secretary to prepare a paper on the above subject, I was aware that it would not possess the interest that attaches to some other subjects that from time to time engage our attention; but the enormous growth of the prepayment meter consumption invests the matter with considerable importance. The number of prepayment meters in use in this country is not less than 3½ millions, and represents in some districts up to 75 and 80 per cent. of the total number of consumers on the books. In view of these imposing figures, the subject may be considered of sufficient interest to occupy a little of the time at our disposal.

METHOD OF COLLECTION.

This is one of the points that must at times exercise the mind of the manager. He is naturally anxious to adopt the method that is the cheapest, and that offers the least opportunity of fraud by consumer or collector. In short, his object is economy and safety. Our Honorary Secretary, in asking me to prepare this paper, said that he had been informed that I was working a special system. I have no reason to suppose, however, that it is peculiar to Lincoln—on the contrary, I believe that precisely the same method of collection is adopted in other places. I have examined other systems in large and small towns; but I have not yet found anything that would induce me to abandon my own, which I will briefly describe to you.

Every prepayment meter fixed is entered in the meter book, and from there posted in the slot rental. The collection is made quarterly. The first step is to prepare a collector's ticket for each meter he has to visit, by writing on it the name and address of the consumer. A copy of the ticket, which explains itself, is shown below.

Register No. . . .	_____
Name	_____
Address	_____
Reading of meter . .	_____
No. of meter . . .	_____
Amount	£_____ s._____ d._____
Collected by	_____

The collector sets out about 9 o'clock, with a man or youth to take charge of the coin-cart. He is supplied with something over 100 empty bags and a like number of tickets, which have been arranged in street order. On reaching the meter, the collector takes the reading of the index and enters the figures on the ticket, adds his initials, and places the ticket in a bag, empties the contents of the coin box into the same bag, uncounted, ties it up, and places it in the cart. Exactly the same course is followed with each meter throughout the day. About 4.30 o'clock the collector delivers up the result of his day's work at the accountant's office, where he obtains a receipt for the number of bags containing coin that he has given up. This he brings to the office with his unused tickets, and the two together are compared with the number of tickets with which he started out, in order to ascertain that every one is accounted for. He is then supplied with tickets and bags for the next day, and so on to the end of his round. The money is counted in the office and banked each day.

In crowded districts the collector and man will collect from £40 to £50 from 100 meters in the 6½ hours working day, and from 75 to 100 in the more scattered areas. The actual cost of collection for the four quarters of last year was as follows:—

Amount collected	£7201 1 8
Collectors' wages	65 13 7
,, per cent.	18 3
,, per 1000 feet sold	0·27d.

These figures compare very favourably with the cost of collection of ordinary quarterly accounts.

We were very late at Lincoln in taking up the prepayment meter, for the simple reason that so large a proportion of the residents was already on our books as consumers that I saw no probability of securing any substantial number of new customers by this means—in fact, I do not suppose that our 4800 slot meters represent 100 new consumers. When we decided to supply them, we fixed the price at 33 cubic feet for 1d. and 396 cubic feet for 1s. Our ordinary selling price was then 2s. 3d. per 1000 cubic feet, and was shortly afterwards reduced to 2s. 1d. No alteration was made in the price through prepayment meters. A simple calculation will show that the prepayment consumer was paying 5d. per 1000 cubic feet more than the consumer by ordinary meter; and in allowing a considerable margin I was guided by almost universal practice, although I had a suspicion that we were treating him unjustly.

I determined to watch the point very closely; and after three or four years, as soon as I had a sufficient number in use to enable me to form a safe and reliable judgment, I came to the conclusion that this class of consumer did not occasion any such additional cost as would justify the charge we were putting upon him. The Gas Committee therefore determined immediately to remove what we were convinced by experience was an injustice.

Returning Discounts.

We were anxious not to alter the meters, so we adopted the cheaper and more convenient system of returning a discount commencing with 10 per cent. Shortly afterwards the ordinary price was reduced to 2s. per 1000 cubic feet, and the prepayment discount increased to 12½ per cent., at which figure it stands to-day. This leaves the slot consumer at 2½d. per 1000 cubic feet above the ordinary selling price; and it more than covers any extra cost that this class of customer may be said to involve. The discount is returned to the consumer each year, in the months of November and December; and coming just in front of the Festive Season it is specially useful. During the collection for the Christmas quarter, the collector leaves a slip with each consumer for his signature, as follows:

LINCOLN CORPORATION.

No.....

NOTICE.

On the production of this Notice at the City Accountant's Office, Silver Street, Lincoln, on and after.....you will be entitled to receive payment of a discount of 12½ per cent. (2/6 in the £) on the amount of cash collected from your Prepayment Meter during the year ended Christmas, 1913.

(By Order)

e Consumer must sign here.

J. H. Burgess,
..... City Accountant.

Date.....191 .

Office Hours—9 a.m. to 5.30 p.m. Saturdays—9 a.m to 1 p.m.

This Notice must be produced when application for payment is made.

The slip, after being signed, is presented at the office on one of the appointed days, and the amount due paid over. I may say the slot-meter rental book is so prepared as to show on one page the amount collected for each of the four quarters, and is provided with a column setting out the total for the year and another showing the amount of discount due, alongside of which is a space for the signature of the person to whom the money is paid. At any period of the year, if a consumer is leaving the city, his meter is taken, the money collected, and the discount paid to him.

One incidental and important advantage of the discount system is that robbery from slot meters is reduced to a minimum. In a paper read by Mr. W. J. Carpenter* a few years ago, he remarked that he was much troubled by thefts from his meters, and these occurred largely in empty houses. Under the discount system it is very seldom indeed that a meter is left in an empty house, to become the easy prey of a passing pilferer. The consumer, who is after his discount, is careful to notify us that he is leaving; so we have every opportunity of clearing the meter before the house is vacated. This system is also much cheaper than it would be to incur the trouble and expense of adapting the meter to any change, up or down, in the price of gas when such alterations are made.

Just Treatment for Prepayment Consumers.

The advent of the prepayment meter marked a distinct epoch in the annals of the gas industry; and it has become an asset of the greatest value and importance. It has been the direct means of enabling the manager to enormously increase his number of consumers by tapping a very numerous class of the community who were formerly quite beyond his reach, and has provided him with a safe and satisfactory method of dealing with slow and unwilling payers without the intervention of a Court of Summary Jurisdiction. With the coin meter at hand, gas undertakings have extended their business, widened the sphere of their operations, and built up their commercial position on a broader, deeper, and firmer foundation than was possible to them without it. Notwithstanding all this, I am driven to the opinion that the prepayment consumer has not been treated with the generosity and justice that he deserves.

We look back with pride upon the history of the gas industry in this country; we appreciate the skill and tenacity of its pioneers; we recognize that it has taken a conspicuous and worthy part in the industrial progress of our land for the full round of a hundred years; and during that time it has met the industrial and domestic needs of ever-increasing numbers of our people. It has a record which is too bright to be sullied by any suspicion of unfair treatment of that great class of the community whose resources are the most limited, and therefore less able to pay any excessive price for the gas they consume.

When the prepayment meter was a new thing, it was quite reasonable that the selling price should be placed at a safe figure. We did not know what cost this class of consumer would involve, and we were justified in fixing such a price as would cover any contingency that we imagined, in our most timorous moments, might arise. Now we can bring these original ideas to the test of wide and extended experience; and, in my judgment, the time for revision has now fully come. As I write, I have before me an example of the calculations upon which the prepayment prices were based. The extract is taken from a report prepared by one whose name is always received with respect in any assembly of gas engineers. It is found in a report presented to his committee and afterwards published.

> The cost of meter readers, clerks, collectors, &c., is 3·76d. per 1000 feet of gas sold greater than what is the case with the ordinary consumers supply. The increased capital outlay involves a further expenditure of 1s. 8d., or 3·63d. per 1000 cubic feet sold. Attention to meters, which are more complicated and necessitate more frequent attention, adds a further 2s. per consumer, or 4·81d.; making a grand total of 12·2d. per 1000 cubic feet in excess of what it costs to supply a consumer by the ordinary means.

I am disposed to think that the author of this statement would find occasion to modify his figures as his experience of the system grew. At any rate, we have here a definite statement which we can all test by our own local conditions. In my case, his charge of 3·76d. per 1000 as extra cost of collection I should abandon altogether; the interest on extra capital outlay charged at 3·63d. per 1000 is represented with me by a fraction of 1d.; and the cost of extra attention to slot meters, which he estimates at 4·81d. per 1000 cubic feet, I put down as practically *nil*.

Of course, no statement as to what extra price should be imposed on the prepayment consumer can admit of universal application. Local conditions are not alike. In some cases the price has to include meter-rent; in others, both meter and cooker rents; in still others added to these services is the piping of the house, including the provision of two or three brackets. But in any of these instances I think it would be difficult to justify the addition of 10d. to 1s. per 1000 cubic feet which, according to the "Gas World Year Book," this class of consumer has to bear in many districts.

That these observations will be criticized is exactly what I expect; and there is one possible criticism that I should like to anticipate. I may be told that there is no general dissatisfaction existing among this class of consumers, therefore why raise the question at all? Why not let sleeping dogs lie? My reply is that sleeping dogs will not always lie. They have a habit of waking up; and the prepayment consumer will one day wake up and ask why he should be singled out by a powerful and opulent industry for exceptional and unfair treatment. I hold it to be a bolder, wiser, and more statesmanlike policy to anticipate a complaint and remove it, rather than wait until that complaint, which has reason in it and justice behind it, becomes a general grievance and assumes the proportions of a public demand for fair play.

DISCUSSION.

Mr. R. G. Shadbolt (Grantham) thought that one might describe the paper as typical of the author. Whether or not Mr. Carter had discovered a mare's nest, he had discovered what he thought was an injustice. Carter-like he had set out to rectify the injustice, and see that wrong was righted. He had stated his case very fairly indeed when he related the history of the use of the prepayment meter; and, of course, in the earlier days, gas managers were in the dark as to the extra cost entailed thereby. He did not think Mr. Carter had given them the average consumption of gas per slot meter in Lincoln.

Mr. Carter: Taking into account all the meters in actual use on Dec. 31 last, including 600 or 700 which had been in use for only a portion of the year, the average consumption worked out to 14,400 cubic feet. Taking those that had been at work a full twelve months, it had been just over 15,000 cubic feet.

Mr. Shadbolt said the reason he asked the question was that the average consumption per slot meter was, of course, a great factor in deciding the additional charge. Taking Mr. Carter's figure of 15,000 cubic feet, there were cases where half the amount would be the average. In that case, whatever the charges might be, they must be met; and the additional price per 1000 cubic feet must be double as compared with that at Lincoln. There were other factors to which Mr. Carter had not given sufficient prominence; and he evidently deemed some items as not being worth including. But all these little items did count. In criticizing something that someone had said, Mr. Carter remarked: "In any case his charge of 3·76d. per 1000 as the extra cost of collection, I should abandon altogether." And he would do this simply because his own cost of collection worked out to 0·27d. per 1000 cubic feet sold. This was very low. He (Mr. Shadbolt) could not help wondering how he got so low a cost when he gave them the number of the meters (100) dealt with by the collectors in a six-and-a-half working day; and 75 to 100 in a scattered district. Taking a figure of 80 (which was a good average), this meant ten weeks' work for one man each collection; and yet the total wages of collectors only amounted to £65 13s. 7d. How did this agree with the general rates of pay existing at Lincoln? It might, of course, be that the whole of the time of these men was not spent in the collection of the money from slot-meters. If this was so, it might explain the smallness of the charge for

* See "Journal" Vol. CVI., p. 216.

collection; but it did strike one that the year's pay for two men was exceedingly low. At Grantham they paid their collectors 1d. per meter per visit. On the same basis as Mr. Carter's, it would amount to 2·8d. His collectors gave a receipt, and bagged the money for the bank, so that they were paying for more work than was done by Mr. Carter's men. Then it occurred to him that there was a disadvantage in this and kindred systems, inasmuch as getting all the money out of the meters, and taking no account of the gas consumed, there was no check on the amount of money that was taken. They got over the difficulty at Grantham by, when there was (say) three pennyworth more gas to be consumed, leaving 3d. in the meter box. In the case of companies, it was necessary to collect once in two months, due possibly to the fact that they were able to deal more generously with their consumers in giving more gas per penny. These were all factors that had effect when they considered the question of the additional cost of this class of consumers. Mr. Carter had mentioned the subject of cooker-rents. These rents were included in the price of gas, and would add materially to the figures Mr. Carter found satisfactory at Lincoln. The point he wanted to make was that statements or impressions such as were given in this paper ought not to go forth without being qualified, because an injustice might be done to other people. Different conditions in different places required different treatment. It seemed to him that a shilling excess was the very outside figure that should be charged. He knew that Parliament permitted 10d. without a cooker, and 1s. with a cooker. But these figures were maxima; and as they were purely maxima, it might be taken that they were well above the ordinary requirements. So to meet the difference between Mr. Carter's 0·27d. for collection and the great many items that had to be covered in other cases, there must be a wide range in the additional price. There was another point that Mr. Carter did not mention, and that was the extra amount required for repairs and maintenance by these meters. There was not only the additional capital cost in the first instance, but there was the additional attention required in keeping the meters going. So these things totalled up; and he imagined there were few cases where, taking all these things into account, 5d. per 1000 cubic feet would be looked upon as an extravagant figure. In Mr. Carter's case, he came to the conclusion that, to make an addition of 5d. per 1000 cubic feet was robbing the poor consumer. Mr. Carter's sense of justice, he (Mr. Shadbolt) knew was very fine; and this might be the cause of his coming down from the figure of 5d. to the minute and distinctive figure of 2¼d. In his own case, 5d. was more than sufficient; but here they were comparing with ordinary meters for which no rent was charged. As to the rent for cookers, in his case the prepayment consumer who had a cooker paid on the 5 per cent. basis, just as did the ordinary gas consumer. But they gave the prepayment consumer, a length of piping as well as a griller, and considered that 5d. would cover it—perhaps 4d. would just about cover it. Was that, however, the only point of view from which this question could be approached? He knew of a case where the slot consumers were practically the only class of consumers—90 per cent. were slot consumers, and the greater proportion of the gas consumed was by them. It was, in that instance, the slot consumer who set the pace, and the ordinary consumer came in at a price. In this particular case, the ordinary consumer was not looked upon as the same factor in prosperity that the slot consumer was. There they had the ordinary consumer and the slot consumer being supplied at the same price. But they ought not to cut these matters too fine. At 5d. per 1000 cubic feet above the ordinary price, the slot consumer in Lincoln was exceedingly well served, and was no doubt well satisfied; and though that might be the case there (and he had no doubt it was the same in other cases where other conditions and other items had to be met), he did not think the slot consumer had any cause to grumble. If, however, they, as gas engineers, went and told the slot consumer that he was being hardly dealt with, he would rise up and ask them to redress this so-called wrong. If they only knew what drove Mr. Carter to take up the case of the slot consumer in this way, they would probably agree with him most heartily; but they really could not see what it was.

Mr. W. D. Child (Romford) remarked that the subject-matter of Mr. Carter's paper had taken him entirely by surprise. His statement was contrary to his (Mr. Child's) own experience; and he felt there was something as to the general accuracy of these matters at which they should arrive. What did Mr. Carter mean by the prepayment consumer being over-taxed? And what did he mean by the "prepayment consumer?" The author said in one part of his paper that he did not suppose that out of his 4800 prepayment consumers more than 100 were new consumers. Did this mean that Mr. Carter had only had to spend money on 100 new consumers? In Romford, they had something like 4000 prepayment consumers upon whom they had had to spend about £6 each. If they looked at the matter from this point of view, he did not think the small amount that Mr. Carter took as a reasonable sum to charge the consumer would be sufficient to pay anything like a fair interest on the outlay of capital. The consumption per prepayment consumer at Romford was just about 12,000 cubic feet a year; and he believed that this was about the average. He took it that the institution of the prepayment meter was to pass on a gas supply to those who could not afford to fit up their houses. But if Mr. Carter used the prepayment meter supply for the purpose of replacing consumption by those already using gas by ordinary meters, then he had not been taxed with the outlay of money as was the case with many of the members who had placed the use of gas within the reach of the poorer class. If he had only had to meet the charges for capital outlay on 100 consumers out of 4800, he had got off very lightly, and could be satisfied with the small sum that he considered would pay over and above the ordinary price. In the case of the Company he (Mr. Child) represented, they charged 9d. extra; and from all calculations he had ever been able to make, he came to the conclusion that, compared with the ordinary consumer, the prepayment one had the best of the bargain. They could only arrive at this by carefully knowing the whole of the outlay for services, prepayment meter, fitting up the houses with piping, pendants, brackets, and cooker; and, as already intimated, in his own case this outlay amounted to something like £6 per consumer. With a consumption of only 12,000 cubic feet per consumer, the 9d. gave 9s. with which to pay the interest and maintenance on an outlay of £6. He certainly thought there must be something behind the question raised which they did not quite understand from Mr. Carter's point of view. When he had given them a little more information, perhaps they would see things in a different light.

Mr. C. G. Grimwood (Sudbury) observed that in his case the average consumption per prepayment consumer was about 12,000 cubic feet; and they got a return by charging 10d. per 1000 cubic feet more to the prepayment consumers. This was, taking the average consumption, about equal to 10 per cent. Where, however, he thought an injustice came in to a certain extent was when some of the larger consumers had to pay in much greater proportion. What he meant was that some prepayment consumers took double the average quantity of gas, while in other cases consumers took ridiculously small amounts. Only the previous day, he was looking over his prepayment rental book; and he pointed out to the collector cases where less than 1s. was taken from the meter every quarter. He asked him how he accounted for these meters being installed. His reply was that the neighbours of these people had gas; and so these people had it put in in order to become fashionable. He (Mr. Grimwood) would like to know how other companies treated consumers of this sort. There were perhaps 5 per cent. of the consumers who only used gas just a little in this way; and it seemed unfair to the others that these people should have gas at a proportionate price.

Mr. A. E. Broadberry (Tottenham) thought a paper of this description ought not to go before the public unchallenged by most of the gas administrations about the country. Mr. Carter had asked for criticism; and he (Mr. Broadberry) thought he had got it pretty thickly already. He thought Mr. Carter deserved a good deal more than he had received. The author suggested an example that he did not think any of them were likely to adopt. Most of them he believed felt that the extra payment they took from the prepayment consumers, or the lower price at which they supplied the ordinary consumers compared with the slot consumers, was justified. In two or three places in the paper, Mr. Carter said that local conditions were not always alike, and that they must all be governed by local conditions. As Mr. Child had pointed out, Mr. Carter might have a knowledge of local conditions which might be a guide to them in judging of the position he had taken up. He (Mr. Broadberry) did not know whether the charge to prepayment consumers included meter-rent. Did Mr. Carter charge meter-rent to all the ordinary consumers? [Mr. Carter: No.] The 15,000 cubic feet would, at the usual rates for meter-rent, be about 4s. or 5s. per annum—say, 5s. This would represent per year 4d. per 1000 cubic feet, and as the prepayment meter cost so much more than the ordinary meter, and also more to maintain it, it certainly looked as if Mr. Carter's 2¼d. difference between the ordinary and the prepayment consumer was inadequate, if they regarded it merely from the question of meter-rent alone. He really could not understand Mr. Carter's object in bringing forward the paper in this particular way. He (Mr. Broadberry) was sure that he could have produced, even from Lincoln, had he approached the question from the other side, far different figures from those incorporated in the paper. Possibly Mr. Carter was going to put up for a seat in the City Council, and was going to use this as an election cry. If he had read the paper in Tottenham, he (Mr. Broadberry) would have suspected that he was going to put up for the Council, and then make an attack on the Gas Company.

Mr. A. F. Young (Bury St. Edmunds) mentioned that, in connection with the collection of money from prepayment meters, they adopted at Bury St. Edmunds practically the same plan as Mr. Carter had described. Before taking up his present position, he was in charge of a gas-works belonging to an urban district council; and they did the same thing there. But the Government Auditor disallowed it; and he made them give the consumer a receipt; which meant that they had to count the money, and make out a receipt on the spot.

Mr. W. W. Townsend (Colchester) said it seemed to him that the members had been talking about two different things. Mr. Carter did not supply anything to his slot consumers but what the ordinary consumers had, except that the meter was different. Most of them supplied the slot consumer with a tremendous lot of accessories to the meter. Not only was there the meter, but a good deal of piping, pendants, brackets, burners, and probably a good cooker. At the town at which he was until recently [Hereford], the average consumption was 10,000 cubic feet per annum; and he was asked by the Committee whether they were not putting on an excessive price in charging an extra 1s. per 1000 cubic feet.

They thought it was an enormous sum. But he (Mr. Townsend) pointed out that, if they took the average consumption of 10,000 cubic feet a year, they got 10s. a year extra out of the slot consumer; and this included meter-rent, stove-rent, the cost of pipes and fittings, installation, and everything else. The figures were taken out and checked by the Borough Accountant, including the money borrowed, and the amount they had to pay in sinking fund, interest, maintenance, &c.; and it was found that the slot consumer had the best of the bargain. It was on this ground the Council found they could not in justice to the rest of the population reduce the price further. If they could have done so, they certainly would have done it. He (Mr. Townsend) was perfectly certain the slot consumer knew that he was well off. He had often given slot consumers the opportunity of taking ordinary meters; and in every case they had declined, unless they took an exceptionally large quantity of gas.

The CHAIRMAN (Mr. Farquhar), in winding up the discussion, remarked that practically the whole of the points that he had had in mind had been mentioned by one or other of the speakers. Particularly he had intended to ask the question that Mr. Townsend had raised, as to whether Mr. Carter was dealing in his paper with the real slot-meter system, because it appeared to him that at Lincoln they did not include everything that was considered as part of the prepayment system. At Ilford, they carcased the houses, put in meter and cooker, fittings, and burners; and taking everything into consideration, he found that the excess charged just about balanced what the slot consumer got, so that the slot consumer was no worse off than the ordinary consumer.

Mr. CARTER said that time was getting on, and he would therefore just answer two or three questions, and make a few general remarks on the discussion. Mr. Shadbolt asked him how he arrived at the actual wages paid to the collectors. The money represented their full six-and-a-half hours' time for each day, and was the actual amount of wages paid to a man and a strong youth who took charge of the coin-cart. It just represented the seven or eight weeks per quarter they were actually at work. Mr. Child asked him whether he had only expended capital in the purchase of 100 additional slot meters. As a matter of fact, they never in Lincoln expended any capital at all, and had not done so for thirty years. The 4800 slot meters had meant this to him: While he had only 100 additional consumers, yet he had had 4700 ordinary meters to bring in, and to replace by slot meters, so that he had had to buy the slot meters.

Mr. CHILD: The houses were fitted up, Mr. Carter?

Mr. CARTER replied in the affirmative. He thought he had sufficiently covered himself, and explained his position on that point. He had referred to the fact that there were other conditions to which his figures, and his Lincoln facts, would not apply at all. There were other considerations where they had to provide cooker, brackets, and piping, which he had had no occasion to take into account. But he thought their friends, in spite of all the criticism he had got, and in spite of all the other criticism he had not had, and which Mr. Broadberry said he (Mr. Carter) richly deserved, he did think that, to arrive at the charge, which applied in a good many gas companies, of 1s. extra per 1000 cubic feet, if they took everything into account over and above what was done for the ordinary consumer, some of the costs he was sure had to be counted twice over. In cases where meter-rents were in force with the ordinary consumer, the slot meter consumer must also pay; and, in certain cases, they might be justified in putting 3d. on to cover meter-rent, and they might put another 4d. on to cover cooker-rent. But please be careful that you do not first of all put your cooker-rent on the slot meter price, and then when you come to ask what interest you shall charge on the total outlay charge the cooker-rent over again. As to the difference in the cost involved by the slot-meter consumer as compared with the ordinary consumer, Mr. Child said that in his case slot-meter consumers involved an outlay of £6 each. He (Mr. Carter) took it that the £6 included the provision of meter; and if it did—well they provided a meter for the ordinary consumer, so that the slot-meter consumer paid in excess beyond the £6 more than the ordinary consumer. His point was what charge was justly attributable to the slot consumer? He had been delighted with the discussion; and he thought there would be some more coming later on. If, however, the raising of this question led his friends to look into the matter again, he had sufficient confidence in their desire to be just and equitable to accept their conclusions as to what was right to be charged under their local conditions.

Professor E. Heyn, of Berlin, one of the most famous scientists in Germany is this year to deliver the annual May lecture before the Institute of Metals. He will discourse on "Internal Strains on Cold Wrought Metals, and Some Troubles Caused Thereby"—a subject of which he has made a life-long study.

The compulsory working of patents and designs was discussed at a dinner of the Imperial Industries Club recently held at De Keyser's Royal Hotel, under the presidency of Sir G. Wyatt Truscott. The opinion was expressed that British industry is unfairly handicapped by foreigners being allowed to take out patents and acquire monopolies without ever working the patents in this country, and that if a patentee does not work his patent in this country it should be automatically open to any member of the trade, after (say) four or five years, to go to the Patent Office and acquire a licence to work it.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Annual Meeting.

The Annual General Meeting of the Eastern District Division of the Scottish Junior Gas Association was held in the Heriot-Watt College, Edinburgh, on Saturday—Mr. W. GEDDES (Granton) presiding over a rather small attendance.

ANNUAL REPORT AND ACCOUNTS.

The HON. SECRETARY (Mr. L. Farquhar, of Alloa) read the tenth annual report, which stated that the membership showed an increase of three over last session; the number of members on the roll being 99, of which 86 were ordinary and 13 honorary members. As in previous years, four meetings had been held during the session, at which papers were read and discussed. The five visits made to various works had been full of interest and very instructive. The attendance throughout had, on the whole, been very satisfactory; and it was hoped that during the next session still greater interest would be taken in the affairs of the Association. Reference was made to the loss sustained in the death of two of the members—Mr. R. Bloxham, of Edinburgh, and Mr. W. Middleton, of Kirkcaldy.

The report was adopted, as were also the accounts, which showed a balance of £9 1s. 8d. in the Treasurer's hands, compared with £8 2s. 7d. at the close of the session 1912-13.

OFFICE BEARERS FOR 1914-15.

Mr. John Chalmers, of North Berwick, becomes President for the ensuing year; Mr. J. J. Scott, of Kennoway, was elected Vice-President; and Messrs. R. J. Philp (Polmont), H. A. Aitken (Kirkcaldy), and A. Mackie (Alva) were appointed members of the Council, in place of Messrs. Hamilton, Mitchell, and Scott, who retired by rotation.

MEMBERSHIP OF THE ASSOCIATION.

Consideration was then given to a motion by Mr. H. E. Doran to alter Rule 3 of the Association, which defines the qualification of membership as follows:

> Any person actively engaged in the manufacture or distribution of gas, or in the manufacture of oil from shale, or in the recovery and working-up of residual products from these and kindred works, or at present being trained as an engineer or chemist with the intention of being engaged in any of these industries. Honorary members to be elected, at the discretion of the Council, from persons associated with gas manufacture, but not engaged in the manufacture of gas appliances, shall be eligible to take part in the reading of papers, discussions, &c., but shall not hold office or take part in the votibg.

Mr. Doran wished the words "or the manufacture or designing of gas appliances" to be inserted after the word "gas," where it first occurs, and the words "but not" deleted after the words "gas manufacture," and the word "or" inserted.

The PRESIDENT remarked that the proposal, if carried, would have far-reaching effects.

Mr. DORAN formally moved his motion; and, in giving his reasons for doing so, said that when the members looked back on the Association's career, they could see that, in spite of the endeavours of their Secretaries, the membership had never been increased very largely beyond a certain point. The membership might be taken to be actually at a standstill. He thought it was rather hard that employees who were working at the making of appliances and were helping in the distribution of gas should be debarred. The alteration in the rule would vastly increase the scope of the Association, open-up a wider field, and increase the membership all round.

Mr. R. J. PHILP seconded the motion.

Mr. H. O'CONNOR (Edinburgh) asked whether it was not the case that already a certain number of those engaged in the industries mentioned were entitled to become members of the Association. He could remember that in the past there were a number of such members.

The PRESIDENT replied he did not know how this could be.

Mr. O'CONNOR said that, when the Association was first started, the question of allowing such men to become members was discussed. At that time it was said that those who were travellers for firms or managers were not eligible. He himself was not allowed to become a member, being a Manager, but he understood that his assistants were.

The PRESIDENT said he knew that at that time there was a feeling that they should keep the Association unspotted from commercialism.

Mr. R. B. CHALMERS moved the previous question; and Mr. J. J. SCOTT seconded.

Mr. PHILP said that, in seconding the motion to alter the rule, he certainly would draw the line at travellers and managers; but men engaged in the works should, he thought, be entitled to become members, but not to vote. The whole idea was that they did not want business to be discussed at their meetings.

After some further remarks, Mr. O'CONNOR suggested that they might meet the case if the words "not engaged on the commercial side of such business" were inserted in the rule. He said a number of the men employed in the firms which manufactured gas apparatus could give a great deal of information, and he did not think the Association would lose anything by their being members. Of course, if the meetings were to be merely the gathering-place

where commercial men came to seek orders and introduce business, the rule should stand as it was. He thought, if those only who were actively engaged in the manufacture or business were admitted, they might get a number of papers on subjects of considerable interest to them; and it would be an advantage to the Association. He did not see that any harm would come to the Association from the motion, if they omitted the purely commercial side of the businesses mentioned.

The PRESIDENT said there was no doubt that by adopting the proposal there would be an immediate increase in membership; and he quite believed what had been said about the greater variety of papers and as to the interchange of knowledge being useful to them. He would be very sorry, however, if the Association were to become the "happy hunting-ground" of commercial travellers; and it was for this reason that the rules were so stringently drawn up at the beginning. It occurred to him that, according to Mr. Doran's notion, the traders might easily outnumber the purely gas men in the Association; and he did not know that this would be a good thing. In fact, one or two members felt so strongly on the question that they said that if the motion was carried they would resign. If, however, Mr. Doran would word his motion to eliminate the commercial element, he (the President) saw no reason why they should not adopt it.

Mr. Doran agreed to adopt the words suggested by Mr. O'Connor; and, on a vote being taken, the motion was carried practically unanimously.

DEVELOPING SALES IN SMALL WORKS.

Mr. C. HAMILTON (Loanhead) then read a paper on the above subject; in the course of which he said:

When I was appointed to Loanhead three years ago, the gas made was about 4 million cubic feet per annum, and the works were very old and in a bad condition. As the plant was inadequate, I could not push the sale of gas to any extent; but in time I persuaded the Company to put the place in order, and we have now an up-to-date works, able, with the exception of the holder, to turn out at least 15 millions annually.

I next directed my attention to the sale of gas. As Loanhead is a mining district, I recognized that it was to the prepayment class of consumer that we must look for new business. I employed a fitter, and his first job was to remove all the obsolete patterns of slot meters, and many of the old wet meters. I have in many cases removed an old wet meter where the customer had stopped using gas, and on testing the meter found that it was not registering. Strange to say, when we fixed a prepayment meter, or even an ordinary dry meter, the consumer discovered a use for gas again. Many of the old meters belonged to the tenants or to the owners of the property. With regard to the prepayment consumers, we found that many of them had ceased using gas because of an escape which the landlord would not be at the expense of repairing; so I made up my mind that we must undertake, to a certain extent, a system of free maintenance, and also to supply fittings at cost price. So far we have been able to get 6s. to 7s. 6d. per point for gas-fitting houses. The price included a strong bracket, costing 2s., a good burner costing, with mantle and globe (say) 2s. 6d., and the balance of 1s. 6d. to 3s. had to cover, as far as possible, piping and the fitter's time. Where the consumers wanted more expensive fittings, we simply added the difference in the cost price. I am not a believer in giving our consumers the very cheapest of fittings, as it would simply mean that the cost of maintenance would be greater; and with a very cheap burner the consumer would more than likely be dissatisfied with the illumination. We supply free of charge and fix free boiling-rings and grills, and I believe that it is to these two useful articles that we owe a considerable part of our increase in sales. The cost to instal is moderate compared with a cooker; and small undertakings must consider the capital cost of such an installation. We fix cookers free, but charge a rent equal to 5 per cent. of their cost. That is to say, a cooker costing £5 would be rented at 5s. per annum. For almost all cookers we fix slot meters, and find that our customers prefer them, as they know exactly what it is costing them to cook their dinner by gas. The price in Loanhead is rather high; but this fault is gradually disappearing. For lighting it is 5s. 5d. per 1000 cubic feet, with 5d. extra for slots; and for heating and power purposes 4s. 7d. When we first reduced the price we noticed that our prepayment customers greatly appreciated the discount; and, on the other hand, we found it very convenient for the cooker rent and payment of fittings. Therefore I mean to let it go on at the old rate, and make the discount larger the next time the price is reduced. Notwithstanding the high price, we have added 200 consumers to our books; and the sale of gas has gone up 2 million cubic feet during the past three years, or 50 per cent. of that three years ago. The results of the past year have justified the means.

In my opinion, small works as well as large ones should have a show-room of some sort, where prospective customers can inspect the various gas appliances and see how to work them. The show-room we have at Loanhead is a small one, measuring 16 ft. by 24 ft. It was originally a store for carts, I believe; but, after spending about £35 on it, we had quite a respectable show-room. The building is on the main street, and since it was opened the results have convinced me that the money was well spent. It is absolutely necessary nowadays to teach your customers how to use gas. Only a few years ago the prospective consumers in Loanhead had to make application for a supply of gas, and where the distance from the main exceeded 20 feet they had to bear part of the cost. To-day we lay the service free to the meter, and we have considered the question of free gas-fitting. It has been said that there is room for electricity as well as gas, but the less room we leave for it the better for the concern under our control.

The PRESIDENT, in congratulating Mr. Hamilton on his paper, said he thought the members would agree that it was a very useful one. In it he had only dealt with gas; but he might also have dealt with the various residuals.

Mr. CHALMERS said they had the same difficulty in North Berwick that Mr. Hamilton experienced at Loanhead—viz., that the people did not know how to use the gas. He hoped when they had their new show-rooms they would be able to educate people.

Mr. R. B. CARSON (Leith) thought that in the show-rooms lay the secret of the success of the sale of gas. They had to point out to people the usefulness of the appliances on view, and explain to them the proper fittings.

Mr. PHILP said in Polmont they did the gas-fitting practically at cost price, and also cleaned the burners and street-lamps.

A vote of thanks was accorded to Mr. HAMILTON, who replied to several questions.

MR. O'CONNOR ELECTED AN HONORARY MEMBER.

The PRESIDENT then announced that the Council had elected Mr. Henry O'Connor as one of their honorary members. [Applause.] They had not asked Mr. O'Connor's permission; but he had no doubt he would not refuse the request.

Mr. O'CONNOR said he appreciated very highly the honour done to him; and he would be only too pleased to further the interest of the Association in any way possible.

THANKS BY THE PRESIDENT.

The PRESIDENT thanked the members for the support they had given him during his year of office.

At a subsequent Council meeting, it was arranged that the words "or the manufacture or designing of gas appliances, but not engaged in the sale of same," should be inserted after the word "gas" where it first occurs in Rule 3.

PITOT TUBES FOR GAS MEASUREMENT.

At a Meeting of the American Society of Mechanical Engineers recently, Mr. W. C. ROWSE read a paper on the above-named subject. The following is an abstract of it.

A series of experiments has been made by the author at the laboratories of the University of Wisconsin to obtain information concerning the reliability of the pitot tube as a means of measuring gases, and to determine the accuracy of various forms of the instrument which are in common use. All tubes were compared with a Thomas electric gas-meter, which was taken as a standard of measurement. Since any variation in results would be due to a wrong method of obtaining the static pressure, simultaneous readings were taken of velocity heads as shown by the tube, using the pitot static pressures, and by the pitot dynamic tube and a piezometer. The pressure as obtained by the piezometer would not be affected by the form of tube used.

The apparatus used in the experiments consisted of a Sirocco fan driven by a direct-current shunt-wound motor, which forced air through the Thomas meter into a galvanized iron pipe, 12 inches diameter, in which the pitot tube was inserted. Variable resistances were placed in series with both the field and the armature of the motor, making possible a wide variation in speed. Screens were inserted at various points, so as to break up eddies and whirls, and to have the air flow as nearly parallel as possible at the point where the pitot readings were taken.

The experimenter was stationed directly under the pitot tube, and all readings were taken at this point. A mercury barometer, hung on the adjacent wall, gave the atmospheric pressure, and a manometer inclined at a 10 to 1 slope made it possible to determine accurately the static pressure in the pipe above atmosphere. The dry-bulb thermometer indicated the temperature of the air flowing in the pipe, and together with the wet-bulb thermometer gave readings from which the humidity could be determined.

Each pitot tube tested had as a part of the tube a means of determining the static pressure, and readings of the velocity head were obtained by using this pressure. Simultaneous readings of the velocity head were obtained by using a piezometer ring for the static pressure, together with the dynamic tube of the pitot tube under test. This piezometer, even if it were possible to be in error, would always indicate the same pressure under the same conditions irrespective of the tube under test, and thus it afforded an additional means of comparison independent of the Thomas meter. The piezometer is simply an absolutely air-tight annular space about the pipe, connected with the interior by six small holes, 0·04 inch diameter.

A large number of readings were taken across two diameters of the pipe. The total area of the pipe was divided into five concentric annular areas, and four readings of the velocity head were obtained in each test at the centre of each annular area; thus giving twenty readings from which the mean velocity head could be calculated. Since the velocity varies as the square root of the velocity head, it was necessary to average the square roots of each of the twenty readings, and the square of this average represented the mean velocity head.

As to the limits of accuracy, the accuracy of the measuring

instruments used is much greater than can be expected from the pitot tube as a means of measuring gases, due to the uncontrollable variation in the air flow. The considerations which may prevent even an absolutely correct pitot tube from giving true results are as follows: (*a*) The air flows through the pipe in a wave or spiral motion, and at no time is the velocity uniformly distributed across the pipe, being greater in one quarter than in the other three quarters. The quarter of highest velocities may or may not be on the diameters where pitot tube readings are being taken. (*b*) The velocities on the diameters where pitot tube readings are being taken may be constantly varying during the period of time necessary to obtain the readings; thus the average of all readings may be slightly too large or too small. (*c*) The air now can only approach, but never reach, the ideal conditions of parallel flow; and the pitot tube is correct theoretically only when the tube is exactly parallel to the current of air.

From these considerations, together with the author's experience in this line of work, it is estimated that the results obtained in measuring gases by an absolutely correct pitot tube may vary 1 per cent., more or less, from the correct results. Of course, the average of a large number of tests should be more nearly correct than this, for the *plus* errors will probably neutralize the *minus* errors.

From a study of the summary of the tests, the following general results and conclusions may be stated:

(*a*) The pitot tube as a means of measuring gases is reliable within approximately 1 per cent. when the static pressure is correctly obtained, and when all readings are taken with a sufficient degree of refinement. In order to obtain this degree of accuracy, the pitot tube should be preceded by a length of pipe 20 to 38 times the pipe diameter in order to make the flow of gas as nearly uniform across the section of the pipe as possible.

(*b*) All the methods of obtaining the dynamic head used in these experiments, including the Stauscheibe, give accurate results.

(*c*) The most reliable and accurate means of obtaining the static pressure is the piezometer or its equivalent; the results of 138 separate tests using the piezometer static pressure agreeing with the Thomas meter within an average of only 0·33 per cent. These results show beyond any doubt that the static pressure is constant across any section of a pipe in which gas is flowing at a uniform rate.

(*d*) Of the methods of obtaining the static pressure by the pitot tube itself, the most reliable and accurate is by means of a very small round hole, 0·02 inch diameter, in the side of a perfectly smooth surface tube.

(*e*) The long slots for obtaining the static pressure are not reliable, and give results which are in error from 3·5 to 10 per cent. The length of the slots or the thickness of the outer tube does not appear to affect the accuracy of the tube.

(*f*) The 45° bevelled straight tube for obtaining the static pressure is not reliable. A very slight change in the angle of bevel produces an appreciable change in the result. In taking a traverse of a pipe, the sides of the pipe affect the readings. But the greatest error is produced by the uncertainty as to whether the tube is pointing directly upstream. The effect of allowing the tube to point at an angle of 20° off the direction of flow is to introduce an error of 85 per cent. in the velocity head.

(*g*) The Stauscheibe gives accurate results using either the static reading from the Stauscheibe and the special formula for it, or by employing the piezometer static with the usual formula for the pitot tubes. In the first case the agreement is within 1·4 per cent. and in the second within 0·16 per cent.

(*h*) It appears that an approximate relation exists between the mean velocity head of a gas flowing through the pipe and the velocity head found by placing the tube at the centre of the pipe. For a 12-inch galvanized iron pipe, results within 2 per cent. may be expected from using the formula

$$v = \sqrt{(2g)\ (0{\cdot}80)\ h_c}$$

where

v = velocity in feet per second.
g = 32·2 feet per second.
h_c = velocity head at the centre of pipe in feet of gas flowing.

COKE OVEN GAS IN AMERICA.

By G. Stanley Cooper.

At a number of places in the United States of America surplus coke-oven gas is used for town purposes. Indeed, several authorities have erected bye-product coke-ovens with the object of so disposing of their surplus gas. At one time doubt was expressed as to the suitability of coke-ovens for this purpose; but experience has shown that this system of carbonization can produce gas which will meet all the requirements of town consumers equally as well as the gas produced by any other system. Several plants are in operation and under construction in the States built by the H. Koppers Company of Chicago.

An interesting installation of this type has been in operation for some time at Joliet (Ill.) by the Coal Products Manufacturing Company. The plant consists of 35 Koppers improved bye-product coke-ovens, with the necessary auxiliary apparatus, having a daily capacity of approximately 450 tons of foundry coke and 3,550,000 cubic feet of illuminating gas, together with the customary quantities of tar and ammonium sulphate. The gas is distributed for domestic purposes among a large number of towns in the vicinity of Joliet. The ovens are of the standard Koppers combination cross-regenerator type, but have a number of improved features, including self-sealing doors and water-cooled stand-pipes. An improved gas and air reversing mechanism has been installed, and a new type of charging car is used on the top of the ovens. Arrangements are made for separating the rich from the lean gas. The ovens are designed for an 18-hour coking period. Special attention has been paid to the coke quenching, screening, and shipping apparatus.

Table I.—*West Virginia Gas Coals.*

—	Special.	Special.	Lincoln.	Lincoln.	Lincoln.	Lincoln.	Average.
Date, December	1	2	3	4	5	6	—
No. of ovens working	6	6	6	6	6	6	6
No. of ovens pushed	7	7	7	7	7	7	7
Coking time, hours	20¼	20¼	20¼	20¼	20¼	20	20
Gas made, 30 inches and 60° corrected	1,025,000	1,062,000	1,160,000	1,141,000	1,174,000	1,135,000	1,116,000
Coal charged dry, net tons	107·2	102·5	109·2	106 1	110·8	104·2	106 6
Cubic feet of gas per net ton	9560	10,360	10,620	10,750	10,502	10,886	10,470
Aver. candle power (Old Sugg "D") (pentane standard)	15·87	17·15	17·05	15·02	16·02	15·49	16·10
Candle feet	75·86	88·84	90·53	80·81	84·12	84·31	84·20
Average B.Th.U.	611	616	632	624	619	634	623
B.Th.U. per lb. of coal	2918	3190	3355	3357	3250	3451	3258

Candle power, flat-flame, 13·37. Candle power, read on flat-flame, 14·65.

Table II.—*Daily Average of Four Days' Test on Lincoln Coal.*

Number of ovens	6
Ovens pushed	7
Coking time	20¼ hours
Average gas made	1153
Average coal charged dry	107·6 net tons
Cubic feet per net ton	10·716
Average candle power (Old Sugg "D")	15·90
Average candle feet	85·22
Average B.Th.U.	627
B.Th.U. per lb., average	3361

A battery of ovens is also under construction for the Laclede Gas Company.

Some time ago the Maryland Steel Company erected a small trial installation of six Koppers regenerative ovens; and on account of the success of these, a further 120 ovens have been ordered. Some tests have been recently carried out using (1) West Virginia gas coal, (2) Lincoln coal, and (3) Westmorland coal in the original six ovens. The accompanying tables give details of the results obtained.

Table III.—*Westmorland ¾-Inch Screened.*

	11	12	13	14	15	Average.
Date, December	6	6	6	6	6	6
No. of ovens working	7	7	7	7	7	7
No. of ovens pushed	20	20	20	20	20	20
Average coking time, hours	1,162,000	1,164,000	1,152,000	1,192,000	1,164,000	1,167,000
Average gas made, 30 inches and 60° corrected	110	109·6	111·8	109·9	114	111
Coal charged, net tons	10,560	10,620	10,300	10,840	10,170	10,514
Gas corrected, per ton	14·52	15·40	16 91	17·3	16·0	16·02
Average candle power (New Sugg "D")	76·66	81·8	87·1	93·8	81·44	84·42
Candle feet	614	608	612	612	600	609
Average B.Th.U.	3242	3228	3152	3317	3054	3209
B.Th.U. per lb.						

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas Purification.

SIR,—Those of your readers who regard favourably the desire to supply gas from which the bisulphide impurity has been eliminated, will be interested to learn that we have recently put to work at our East Greenwich station a plant for this purpose, having a total capacity of 15 million cubic feet of gas per diem.

It is gratifying to add that the anticipations of greatly lessened first cost and working expenses, compared with the figures given to last year's meeting of the Société Technique de l'Industrie du Gaz en France, have been realized.

CHARLES CARPENTER.

South Metropolitan Gas Company,
April 25, 1914.

Waidener and Mueller on Industrial Gas Calorimetry.

SIR,—Apropos of the "Editorial" remarks in your issue of the 14th inst., regarding the comparative accuracy of the Junkers and Boys calorimeters (stated by Messrs. Waidener and Mueller to be 2 per cent. low in the case of the Boys instrument), the following test results obtained under my supervision in 1911 may be of interest. They go to substantiate your contention that there is practically nothing to choose between the two calorimeters of latest design and carefully manipulated.

The instruments were coupled-up side by side to the same test-meter, and the tests were made almost daily. The gas tested consisted of samples of coal gas collected periodically in a holder of 200 cubic feet capacity.

W. B. DAVIDSON.

Nechells Gas-Works, Birmingham,
April 24, 1914.

Net British Thermal Units per Cubic Foot.

Sample.	Junkers.	Boys.	Difference.
1	513	513	*nil*
2	520	519	− 1
3	515	515	*nil*
4	527	529	+ 2
5	509	507	− 2
6	507	505	− 2
7	514	514	*nil*
8	505	503	− 2
9	525	523	− 2
10	513	514	+ 1
11	508	507	− 1
12	511	509	− 2
13	512	513	+ 1
14	513	511	− 2
15	482	484	+ 2
16	516	519	+ 3
17	504	505	+ 1
18	546	544	− 2
19	528	529	+ 1
20	512	514	+ 2
21	508	508	*nil*
22	509	509	*nil*
23	534	532	− 2
24	548	550	+ 2
25	511	513	+ 2
26	515	514	− 1
27	502	500	− 2
28	514	517	+ 3
29	510	513	+ 3
30	509	505	− 4
31	549	550	+ 1
32	533	535	+ 2
33	535	535	*nil*
34	521	523	+ 2
35	491	492	+ 1
		Mean Difference . .	+ 1

Washing Breeze by Hand.

SIR.—Referring to the article by "Modus Operandi" in the "JOURNAL" for April 14, will he kindly give, in an early issue, further particulars as to the construction and arrangement of the special drying floor used, as from his remarks I think a similar arrangement would be very useful here.

May I take this opportunity of expressing my appreciation of the many useful hints contained in his articles?

R. S. RAMSDEN.

Burton-upon-Trent, April 21, 1914.

Costly Electric Lighting.—One of the reasons assigned for a higher estimate for the Limerick Corporation rates (making the total 11s. 5d. in the pound, or 3d. in excess of last year), is the increased cost of the electric lighting undertaking.

Penzance Gas Company.—The annual meeting of the Penzance Gas Company was held on Monday of last week, when the Chairman (Mr. Percy T. Chirgwin) said that the year had been a record one in the history of the undertaking, notwithstanding the large increase in previous years. The additional gas sold during the twelve months would make their annual output 63,694,700 cubic feet. The make and sale of gas per ton of coal were 13,450 and 12,453 cubic feet respectively. They had secured more new consumers than in any other year. The shareholders expressed themselves as highly satisfied with the year's results; and the usual dividend of 6 per cent. was declared.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Private Bills:—

The Bedwas and Machen Urban District Council Bill was read a second time and committed.

The Mexborough Urban District Council Bill and the Ellesmere Port and Whitby Urban District Council Bill were read the third time, passed, and sent to the Commons.

The Brentford Gas Bill was reported with amendments.

Bills brought from the Commons, read the first time, and referred to the Examiners: Local Government Provisional Orders (Nos. 1 and 2) Bills; Preston Corporation; Barnsley Corporation; Southend Gas.

Petitions have been presented by the Cheshire County Council against the Kidsgrove Gas Bill; Pinxton Collieries and others against the Riddings District Gas Bill.

HOUSE OF COMMONS.

The Inverness Water and Gas Provisional Order Bill was read the second time and ordered to be considered.

The British Gas Company (Hull Station) Bill was reported without amendment for third reading.

The St. Anne's-on-the-Sea Improvement Bill was reported with amendments.

Bills read the third time and passed: Southend Gas; Barnsley Corporation; Inverness Water and Gas Provsional Order Bill.

The Mexborough Urban District Council Bill and the Ellesmere Port and Whitby Urban District Council Bill were brought from the Lords, read the first time, and referred to the Examiners.

Notices were given for the rejection of the Skegness Gas Bill and the Whitwell Gas Bill, and also that it be an instruction to the Committees on the Bills to leave out the clauses which refer to the auditing of the Companies' accounts.

The Tees Valley Water Bill has been referred to a Select Committee consisting of Mr. W. G. Nicholson (Chairman), Sir Matthew Wilson, Mr. Aneurin Williams, and Mr. Cullinan; to meet to-day, April 28.

The following petitions against private Bills have been withdrawn: Wakefield Rural District Council and Great Northern Railway Company against the Ossett Corporation Bill; Preston Corporation, and John Talbot Clifton against the St. Anne's-on-Sea Improvement Bill; East Sussex County Council against the Hayward's Heath Gas Bill.

Gas and Water Provisional Orders (No. 1) Bill.

This Bill, "to confirm certain Provisional Orders made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, relating to Dursley Gas, Hayfield Gas, High Wycombe Gas, Amersham, Beaconsfield, and District Water, and Elham Valley Water," was presented in the House of Commons by Mr. Robertson, read the first time, and referred to the Examiners.

Lanarkshire Gas Order.

An official minute, dated the 15th inst, dealing with Private Legislation (Scotland) Procedure, contained the following entry: Commissioners having recommended that the Lanarkshire Gas Draft Provisional Order should be issued with modifications, the draft Order, as modified, has been printed; and deposits have been made as required by General Order 98. The Provisional Order will not be finally made and issued before April 24.

BRITISH GASLIGHT COMPANY (HULL STATION) BILL.

The Unopposed Bills Committee of the House of Commons, presided over by Mr. M'LEAN, the Deputy-Chairman of Ways and Means, dealt with this Bill on Thursday last. It has already passed the House of Lords.

Mr. SEAGAR BERRY (Messrs. Sherwood and Co., Parliamentary Agents) explained that the Bill is promoted by the British Gaslight Company—a rather unusual and peculiar Gas Company. It was established by Deed of Settlement in 1824; and its undertaking consisted of five separate gas-works at Hull, Norwich, Stoke (the Potteries), Holywell, and Trowbridge. At Hull, Norwich, and the Potteries the Company worked under Acts of Parliament, and under Provisional Orders at the other two places. In some respects, however, the Company was not governed by the ordinary provisions of a gas company, and, indeed, its provisions were somewhat more stringent than usual. In 1858, the sum of £57,000 had been raised and spent on the Hull undertaking; and this was 10 per cent. stock. Under an Act of 1858, a further sum of £42,000 of 7½ per cent. stock was authorized; and in 1876 an additional £80,000 of 7 per cent. stock (or if preference 6 per cent.), while £20,000 was authorized to be raised on mortgage at 5 per cent. In 1884, the sum of £160,000 as 7 per cent. ordinary or 6 per cent. preference stock was authorized, in addition to £45,000 of 5 per cent. mortgages. In 1901, £140,000 of 5 per cent. ordinary stock was authorized, with £60,000 on mortgage at 4 per cent. Thus the dividends allowed on the capital had been gradually reduced; but in the present Bill 5½ per cent. was being asked and 4½ per cent. on the mortgages—the respective sums being £300,000 and £100,000. The position was that the Company was only entitled to pay dividends on the capital actually spent; and the policy of the Board was to decide how much capital would be required for a certain short period and issue capital accord-

ingly. If £75,000 were issued in shares, and only £60,000 spent, then dividends could only be paid on the £60,000.

Mr. ERNEST MOON, K.C. (Speaker's Counsel), pointed out that the price of the Company's £20 shares now stood at £44 to £45.

Mr. SEAGAR BERRY said that was so; but the lowest price at which the Company could at the present time raise capital was 5½ per cent., and that was why this figure was put into the Bill. If, as had been suggested by the authorities of the House, the stock should be 5 per cent., it would be penalizing the present shareholders for the benefit of new shareholders. In 1901, money was obtainable at 5 per cent.; but now it was not. The Company was only desirous of having the figure at which money could now be raised inserted in the Bill.

Mr. MOON: Is the suggestion that you cannot get £100 for £100 of shares in the Company unless you offer 5½ per cent.?

Mr. SEAGAR BERRY: Yes.

Mr. *A. W. Brooks*, the Secretary to the Company, said the method of raising capital was to issue shares to the existing shareholders; the price being regulated according to the market price at the time of issue. During recent years, 10 per cent. and a bonus of 2½ per cent. had been paid on the ordinary shares; and the shares to-day could be bought by the public at a price which would yield £5 11s. 1d. per cent. When the Company in 1901 agreed to 5 per cent., the shares were yielding £4 18s. 1d.

Mr. MOON: You ask to be exceptionally treated. You are not under the auction clauses. Suppose you put up your stock to auction in the ordinary way, would not you get £100 for every £100 of stock to which a 5 per cent. dividend was attached?

Witness: I do not think so. There is one very important question which governs the matter. The Company, because of its not having these clauses, has been deprived of the benefit of the sliding-scale, under which we could pay very much larger dividends than we do, as we sell gas at 1s. 10d., whereas our maximum price is 5s.

Mr. SEAGAR BERRY said that, if the present proposal was sanctioned, the average return on the whole of the Hull capital of the Company would be £5 17s. 9d. The Hull Corporation had considered the Bill very carefully, and the amount of capital had been reduced from £400,000 to £300,000. But no objection had been taken on the question of the dividend.

The CHAIRMAN said there was a vast difference between the Money Market now compared with 1901.

Mr. *Brooks*, in answer to further questions, said that £146,000 would have to be immediately spent on new plant; and this did not take account of any distribution work. He also pointed out that the Company had not paid all the dividends it might have done, but had invested profits in the business, with the result that the capital per million cubic feet of gas sold was now down to the very low figure of £369.

The Committee decided to pass the preamble of the Bill, which was ordered to be reported for third reading.

OSSETT CORPORATION BILL.

HOUSE OF COMMONS LOCAL LEGISLATION COMMITTEE (SECTION A).

Wednesday, April 22.

(*Before Mr.* MIDDLEBROOK, *Chairman, Mr.* ACLAND ALLEN, *Mr.* EDGAR HORNE, *and Mr.* FLETCHER)

The object of this Bill is, among other things, to obtain further powers for the Corporation in connection with their gas undertaking, principally in relation to testing.

Mr. W. J. JEEVES and Mr. O. F. DOWSON appeared for the promoters; and Mr. G. J. TALBOT and MR. THOMAS represented the Horbury Urban District Council, the only opponents.

Mr. JEEVES, in opening the case for the Bill, said that up to 1900 the gas undertaking in the district was the property of a Company, who supplied not merely the borough of Ossett but also the adjoining urban district of Horbury. In that year an Act was promoted by the Ossett Corporation for the acquisition of the undertaking; and under the provisions of that Act possession was taken in 1901. The Act provided that while the undertaking should be acquired and worked by the borough of Ossett, Horbury was to have the advantage of being supplied with gas at the same price as that charged in Ossett. There was a further provision for the protection of Horbury—that the Corporation should not be entitled to raise the price without the consent of the Horbury Council, subject to arbitration, and that the Horbury District Council should have the right to apply to have it lowered, also subject to arbitration. Therefore, the agreement entered into between Horbury and Ossett so protected the former that they had all the advantage of the acquisition of the undertaking by a local authority without having had to find any money themselves or having the trouble of management. Further, there was a provision in the agreement that, under two years notice to the Ossett Corporation at the end of ten years, and after ten years by giving three years' notice at any time, the Horbury Council might purchase that part of the undertaking which was in their district, on terms of the value of the undertaking; provision being made that they should have the benefit of any payments which had been made before purchase by way of sinking fund in reduction of debt, and any provision made in this way should make a reduction of what they would otherwise have to pay for goodwill. They therefore had power to purchase on unusually favourable terms. In relation to the acquisition of the Company's undertaking by the Ossett Corporation, section 25 of the Act prescribed that the quality of the gas should be 15 candles, and that within six months of the transfer a testing-place should be provided at some convenient part of the gas-works. The standard burner was to be used; and the provision in regard to the testing was the ordinary one in relation to the illuminating test. In the present Bill, however, power was asked for substituting for the illuminating test a calorific value test. This was objected to by the Horbury Council; and he gathered that their objection was not so much directed to the change of test as to a suggestion which they made that there should be an additional testing-place provided within the Horbury district. The Horbury Council had assented to the acquisition of the undertaking from the old Company with one testing-place; and the substitution of the calorific for the illuminating value test was no argument for an additional testing-place. Since the present testing-station had been at the works of the Corporation, the Horbury Council had never availed themselves of it, nor appointed a gas examiner. The Corporation therefore asked that they should be allowed to continue the present testing-place in accordance with the provisions of the 1901 Act. Not only did Counsel rely upon the provisions of the Act, but he pointed out that the gas-works were in as convenient a position for the Horbury Council as for the Ossett Corporation; being about mid-way between the two Town Halls. Further, he submitted that for a gas undertaking of this size, dealing with some 126 million cubic feet per annum, it was quite unnecessary for two testing-stations to be provided. There was no precedent for two calorific testing-stations except in the case of one or two of the larger London companies. In the case of the Brentford Gas Bill, for instance, it was asked that there should be additional testing-stations in each area; but the Committee would not sanction it. In that case the Company were taking over two other gas undertakings; and it was provided that, as long as gas was supplied from either of the works taken over, there should be a testing at the works; the Committee definitely laying it down that they would only allow one testing-station for each works, in the case of works which supplied a great number of local authorities, and which had not the same interests. In the present case, however, the interests of both Horbury and Ossett were identical, because if there were any surplus profits they were to be shared between the two authorities in proportion to the relative consumption. The consumption in 1913 in Ossett was 68,968,400 cubic feet, and in Horbury 47,441,000 cubic feet. In the two adjoining parishes of Crigglestone and Shitlington, also supplied by the undertaking, there was a consumption of just under 15 millions; so that Horbury was consuming about one-third of the total output. Coming back to the question of the calorific test, Counsel pointed out that clause 46, which deals with this, provides that within six months of the passing of the Act the gas shall have a standard calorific value of 520 B.Th.U. gross per cubic foot, with a penalty line at 475 units. Sometimes, continued Counsel, in these cases a calorific value of 540 B.Th.U. has been taken, and in some cases less than 520, especially in the case of Middlesbrough, where it was very much less. The Ossett Corporation would have had no objection to 540, but for the fact that this might necessitate getting their coal from a distance, instead of locally. It was desirable to use local coal, in order to keep the price down. In this case, a value of 520 B.Th.U. only would be obtained; whereas if the coal had to be got from a distance so as to ensure 540 B.Th.U. the price would go up. Counsel suggested that, in the interests of the whole of the consumers, the limit should be 520. He did not think that the Horbury people would want a test which would tend to increase the price of gas in both places.

Mr. *A. E. Mottram*, the Engineer and Manager of the Ossett Corporation Gas-Works, in connection with the alteration in the test, said there was a considerable increase in the use of incandescent mantles; these being employed in almost every house. The Ossett Corporation also supplied cookers and gas-engines on easy payment terms; and there was a considerable tendency to increase the consumption for heating and power purposes. The illuminating power tests at present were taken by him; and the Horbury Council were satisfied with these, without having their own examiner. He saw no objection to having an additional testing-place, except the Corporation objected to being saddled with two prescribed testing-places. It was almost without precedent in their neighbourhood, except in one case, and this was granted on special conditions. There was no reason, where the illuminating test prevails with only one testing-station, to have an extra station on the adoption of the calorific value test. In fact, it was the other way about, because the calorific value did not vary to the same extent as the illuminating power, and there was no need for a second test at all. The two parishes of Crigglestone and Shitlington, which were supplied by the Corporation, were farther away from the works than Horbury. They did not ask for separate testing-stations; they were perfectly satisfied. Although 520 B.Th.U. was the value asked for in the Bill, the penalty point began at 475, which was usually the penalty point when the original standard was 540; so that although they were asking for a reduction of the original value, the same penalty point was prescribed. If the standard was fixed at 540, and the gas supplied was between 520 and 530, the Corporation could not be penalized; so that the Horbury Council had nothing to gain on this point.

Mr. JEEVES asked if witness feared some difficulty in supplying 540 B.Th.U. regularly with the coal they were accustomed to.

Witness said he could not say that with the present coal. But he would like to be able to buy cheaper coal, which would give 520 B.Th.U., and thus lower the price. Continuing, he said that since the acquisition of the undertaking by the Corporation the price of gas had been reduced from 2s. 10d. to 2s. 2d.

Mr. TALBOT, in cross-examination, said that the ordinary consumers in Horbury were about 46 per cent. of the whole, and therefore the Horbury Council was vitally interested in the undertaking. In the agreement of 1901 there were certain provisions for making a test of the gas; and now the Corporation wanted to alter the whole basis of the test. Witness put this down to the change that has taken place in the industry the last little while.

The CHAIRMAN asked whether there was any legal objection at the moment to Horbury setting up their own testing-station, within their own area, and at their own expense.

Mr. TALBOT said that, so far as he knew, they could do this.

Witness said that if they did this, and found on any day that the gas was below the standard, they could, under the terms of the Bill, go to the prescribed station at the gas-works, and take a test on the official instrument.

Mr. TALBOT: Suppose they found a different result?

Witness said that they would have to adhere to the result obtained at the testing-station at the works. Continuing, he said that the Horbury

Council apparently would not go to the cost of keeping a qualified examiner.

Mr. TALBOT said there was only to be one test in one day, unless the gas was ascertained to be below 447 B.Th.U. He asked what illuminating power this would represent with a flat-flame burner.

Witness could not give a definite value, but thought 13 candles would be a fair quality with the No. 2 burner, which was the one prescribed by the Board of Trade for this undertaking. A higher candle power gas would have to be supplied for use with a flat-flame burner than with an incandescent mantle; the difference being about 1½ to 2 candles. It was not proposed to alter the prescribed burner, however, with the alteration of the test.

Mr. TALBOT also made the point that the Corporation wanted to make worse gas than they were at present supplying; but the consumers wanted better gas.

Witness suggested that 20 B.Th.U. out of 540 would not be noticeable to ordinary consumers. But a reduction in the price of gas would be a benefit.

In re-examination, witness said there should not be any difference in the calorific value of the gas at different stations if the tests were taken properly.

In answer to the CHAIRMAN, witness agreed that the Corporation objected to be bound by the results of tests taken at a testing-station over which they had no control. It was quite impossible, without considerable alteration to the mains, to send out two different qualities of gas to the two districts at the same time. At the works there were three gasholders coupled together at the governors; and in order to send out different qualities of gas at the same time there would have to be two distinct producing plants, two separate holders, and distinct connections to the different areas. The reduction of the prescribed calorific value of the gas from 540 to 520 B.Th.U would make a difference of 1s. 6d. to 2s. per ton of coal. If any loss was made on the undertaking it would have to be borne by the Ossett rates alone.

Mr. JEEVES said that the tests made by the Ossett Corporation were published; and the Horbury Council could publish tests which they had made if they thought fit.

Mr. EDGAR HORNE (a member of the Committee) suggested 500 B.Th.U. as the penalty point, instead of 475.

Witness said he thought this too high to fix definitely. Although it might be suitable at present, it might not be so in the future.

This concluded the case for the promoters.

The CHAIRMAN announced that, in order to facilitate an agreement between the parties, it was the view of the Committee that they would not be likely to depart from precedent with regard to the reduction of the standard of the calorific test, nor with regard to the amount of the penalties, and assumed that the standard would have to be 540 B.Th.U.

Thursday, April 23.

When the Committee met this morning,

Mr. JEEVES said that, having regard to the remark of the Chairman at the close of the proceedings yesterday, the Corporation would not ask for the calorific test clause in the form in which it appeared in the Bill. They were perfectly prepared to take the 540 B.Th.U. standard and the penalties as laid down in the Morley clause.

The case for the Horbury Urban District Council was then taken.

Mr. *E. H. Stevenson* said he was strongly in favour of the change from the illuminating power test to the calorific value test—indeed, he had fought for it as hard as he could, while the companies were very shy of it. But now even companies were asking for it, as they saw the benefit. The calorific value was the real test; and with a proper self-registering machine the test absolutely eliminated the human factor. He did not know of any two men testing at the same time for illuminating power who could ever bring out exactly the same result. As to whether it was easier to keep up a uniform value of calorific power as compared with the illuminating power depended upon the size of the undertaking and the output of the carbonizing apparatus. This was a comparatively small undertaking; but Dessau vertical retorts of large capacity were now being installed, and there was no doubt that with this carbonizing plant the quality of gas would vary enormously. These retorts were practically coke-oven retorts, only vertical instead of horizontal or sloping; and it was well known that in these retorts the quality of the gas varied enormously. This was shown by the proposal of the Middlesbrough Corporation to buy coke oven gas from Messrs. Samuelson's; for it had been provided that the poor quality gas should not be taken by Middlesbrough. The gas was very much richer for the first four hours in Dessau retorts than afterwards, and by continuing the period of carbonization the quality could be very much reduced. Practically any quality of gas could be turned out, according to the heat of the retort and the length of the period the coal was in the retort. Under clause 46, a very large margin was allowed below the standard fixed in the Bill. This, he believed, was common to all the cases in which a calorific value test had been given; but he did not think it would eventually be a permanent state of affairs. The question of testing the gas upon the calorific value basis was in its infancy; and he believed there were only five undertakings which had it—namely, the Gas Light and Coke Company, the South Suburban Gas Company, the Wandsworth Gas Company, Morley, and Porthcawl.

Mr. JEEVES mentioned that Redcar also had the calorific value test.

Witness said he believed they had both; but the five cases he had mentioned were exclusively calorific value, except the Gas Light and Coke Company. In all these instances there were many testing-places, and not only at the works. The condition in the Bill that a test could be taken at any hour of the day or night was a very fair one; but sub-section (*b*) of section 4 of clause 46 was not consistent with this, because it provided for reasonable notice being given. This would mean that a gas examiner could not go to the works at any time to test without notice—in other words, the Corporation would always know he was coming.

Mr. JEEVES said the Corporation would agree to strike out the words in sub-section (*b*) which provided for notice being given.

Mr. TALBOT suggested that, unless other words were added, there might exist a certain ambiguity in the wording. He was afraid that there might be an implied obligation upon the Horbury Council to give notice of a test unless it was specifically provided to the contrary in the Bill. This might be argued in a Court of Law; and it should be made clear.

Witness, continuing his evidence, said he had no objection in principle to sub-section (*c*) of clause 46, with regard to the making of two tests; but if the Committee gave the Horbury Council a testing-station of their own, then he suggested that the Ossett Corporation need not be represented at the first test. If a second test were necessary, however, then notice should be given to the Corporation that it was to be taken. The whole of this matter was coming up for consideration on the Gas Light and Coke Company's Bill, and several cases had already been postponed this session until a decision on that Bill had been given. In view of the proposed changes in the method of testing, he maintained that Horbury should be adequately protected as to the quality of the gas supplied. Although he did not suggest that they would do it, there was a possibility of two qualities of gas being sent out—one to Horbury and another to Ossett; so that a test in Horbury would not necessarily be a test of the gas actually supplied to Ossett. This had been done in other places; and a testing-station would protect the Horbury Council against any action of this sort. Apparently the view of the Corporation was that they did not want an official testing-station in Horbury; but there were many precedents for official testing-places away from the works in the cases of the gas undertakings already testing on the bas s of calorific power. In the case of the South Suburban Bill, eight new testing-places were prescribed as recently as 1912. At Wandsworth there was only one; but another was given to the Wandsworth Council. A similar thing happened at Aldershot and at West Ham. In the latter case, the station was removed from a distance of 1000 yards from the works to three miles, as it was found that the Company had been enriching the gas by benzol during the hours of test. The three miles distance did not allow the benzol to carry.

In cross-examination, witness maintained that an expenditure of about £100 would enable an alteration to be made in the connections between the holders so that a different quality of gas could be sent to the two districts.

Mr. JEEVES asked if he had taken into consideration the fact that all the gas was sent out through a booster, and that in consequence a new booster would have to be provided if Mr. Stevenson's suggestion was carried out.

Witness agreed, if this were so, that another £200 or £300 would have to be spent.

Mr. JEEVES: We should have to incur an expenditure of something like £500 to do a dishonest thing.

Witness, answering further questions in cross-examination, dealt with the capacity of the present retorts, and the further capacity of the new Dessau retorts; but there was considerable difference of opinion with regard to the figures. Witness said that the present retorts carbonized about 17 cwt. of coal per day, whereas the new retorts could go up to 2 tons. Against this Mr. Jeeves said the figure of the new retorts was 18 cwt. Witness replied that these retorts could deal with two charges per day. He agreed that there was not so much likelihood of variation in calorffic value as in candle power, but was unwilling to accept an unofficial testing-station for Horbury, as the results of it could not be accepted by a magistrate. Counsel suggested that it would meet the circumstances of the case if the Horbury Council had a self-registering apparatus, and that if they found the gas below the proper standard they could then come and test at the official station. Witness, however, insisted that it was only fair for a second testing-station to be away from the works, where the Council could test without notice. This station he offered to provide.

In re-examination, witness said that he had only been called in to advise the Horbury Council within the last few days. When he saw the petition objected to the calorific test, he advised the Council that he could not support this, nor could he support two tests, as had been suggested in the petition.

In answer to the CHAIRMAN, witness said that the automatic testing apparatus he had referred to he regarded as so perfect that everybody could now accept its results.

The CHAIRMAN: Is your desire for a second testing-place based solely on the convenience of Horbury not having to go to Ossett?

Witness: No, but on the ground that we should be able to have as nearly as possible a continuous test of the gas supplied to us. If we have to go to Ossett, we should have to appoint a specially qualified man who would only go at considerable intervals; and during these intervals we should not know anything about the quality.

With regard to the varying quality of the gas from different retorts, does not it all get mixed in the holders and become the average quality?—Yes.

Therefore would it not be impossible to deliver gas of varying quality, unless there are separate holders and separate mains?—Yes, that is so. But here they have separate holders, and the mains are separate outside the governors, although I do not suggest that they would do it.

The CHAIRMAN then raised the question of whether or not, under the Gas-Works Clauses Act, a magistrate would be bound to accept, as evidence, tests taken at an unofficial testing-station, in the event of a prosecution.

Witness said the average of the first test taken at an unofficial testing-place and the second test taken at the official testing-station would be the figure which the magistrate would have to consider.

The CHAIRMAN pointed out that this was not expressly laid down in the Gas-Works Clauses Act.

Mr. TALBOT said it had always been assumed that the test at the prescribed testing-place was the figure which must be taken into account in any prosecution. Looking through the Act, however, in consequence of the Chairman's remarks, he was bound to say that he could not find this expressly laid down; and if a test at an unofficial testing-place could be accepted by the magistrate, then the Corporation and the Council were fighting about nothing. Evidently, therefore, the Committee would have to make the point clear in the Bill.

The CHAIRMAN: I do not know whether we ought to go to that extent, supposing we give Horbury a testing-station. Assuming that we declined, I do not think it would be within our province to so vary the Bill as to make it clear in terms of the Bill that evidence from a prescribed testing-station should be binding upon the magistrate to the exclusion of all other evidence.

After further discussion on the point,

Mr. TALBOT said a simple way to deal with the matter would be to make the Horbury testing-station a prescribed station, and leave the Council with whatever risks there were as to the acceptance of evidence under the Gas-Works Clauses Act. Continuing his remarks, the learned Counsel, addressing the Committee on behalf of the Horbury Council, said the request for a testing-station in the Council's area was a very small one. Incidentally, he remarked that the calorific clauses, as at present drafted, constituted a most unsatisfactory piece of legislation, and he hoped that the authorities of the House would revise them before they became standard.

The CHAIRMAN said the Board of Trade had taken the matter up with the authorities of the House, with a view to drafting a Model Clause. It might influence the Committee in saying that whatever course were taken with regard to the Bill would be subject to this.

Mr. JEEVES, replying on behalf of the Ossett Corporation, drew attention to the fact that up to now the Horbury Council had relied upon the tests taken at the works by the Corporation, and had not even appointed a gas examiner. If they wanted to vary the procedure, they could have a self-registering apparatus in their own district, and then take an official test at the works if the value of the gas was found at any time to be below the standard. In 1901, when the works were taken over by the Corporation, Horbury did not ask for a separate testing-station, and there was nothing in the change from the illuminating power test to the calorific value test which warranted a second station now.

The CHAIRMAN, in giving the decision, said: The Committee have come to the conclusion that, so long as the present conditions of the supply of gas of the same quality to Ossett and Horbury continue, they do not feel the claim for a separate testing-station is justified; but if and whenever Ossett shall commence to supply gas from different sources of supply—I hesitate a little as to the exact words, but I mean from different holders—then Horbury shall be entitled to its station subject only to the condition that any official tests to be made shall be after reasonable notice to the Ossett Corporation, and the word "reasonable" may be interpreted into a certain number of hours' notice when the exact clause is drawn.

This decision still leaves the final adjustment of the calorific value testing clauses subject to the remark of the Chairman as to the decision of the Model Clause.

The London Association of Accountants petitioned against the Bill generally and not specifically on the gas clauses, on similar lines to their other petitions, with the object of securing the insertion of the name of the Association in the clause dealing with audit. The Committee, however, refused to grant the request, which has failed all along the line so far. In this case, the Chairman said the Committee did not think it wise to give local authorities power to appoint whom they pleased as auditors. There must be some limitation upon them.

ISLE OF THANET GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Wednesday, April 22.

(*Before Sir* HARRY SAMUEL, *Chairman, Mr.* FRANCE, *Mr.* ORDE ROWLETT, *and Mr.* ROBINSON.)

The objects of this Bill are to transfer by agreement the Broadstairs Gas Company's undertaking to the Isle of Thanet Gas Company; to authorize additional capital; sanction the use of lands for gas purposes; to substitute a calorific test for an illuminating power test; and to make miscellaneous provisions with regard to the amalgamated undertaking.

Counsel for the Bill were: Mr. HONORATUS LLOYD, K.C., Mr. LYNDER MACASSEY, K.C., and Mr. SZLUMPER. The opponents were the Margate Corporation, represented by Mr. BALFOUR BROWNE, K.C., and Mr. TYLDESLEY JONES, and the Broadstairs Urban District Council, represented by Mr. VESEY KNOX, K.C., and Mr. KEEN.

Mr. HONORATUS LLOYD, in opening, dealt first with the history of the Isle of Thanet Gas Company, which was incorporated in 1824, with supply limits including "Margate, Ramsgate, Broadstairs, and the suburbs and vicinity and parts and places adjacent." Further Acts were passed in 1877 and 1898. The Company, as a fact, never supplied in Broadstairs; and in 1851, the Broadstairs Gas Company, a non-statutory undertaking, was formed and supplied gas there. In 1875, this Company was incorporated by Statute; and when the Isle of Thanet Company came to Parliament in 1877, Broadstairs was struck out of their area of supply. In the same year, the Ramsgate Local Board acquired the Ramsgate portion of the Isle of Thanet Company's undertaking. Since 1877, therefore, the Isle of Thanet Company had only supplied Margate and the immediate neighbourhood. The capital of the Thanet Company was as follows: Ordinary capital authorized in 1877, £88,000, with £80,000 additional, or a total of £168,000. Of this, there is paid up £136,787; leaving unissued £31,212. The loan capital authorized in 1877 was £11,000, and under the 1898 Act £30,333, or a total of £41,333. Of this, there has been borrowed the £11,000 under the 1877 Act; and the amount authorized under the later Act, £19,929, could now be borrowed in respect of the capital issued under that Act. The Thanet Company was a sliding-scale concern, with a standard price of 4s. 2d.—the standard dividend being 3½ per cent., with a slide of 2s. 6d. for every penny up or down. The actual price charged, however, was 2s. 4d.; so that the Company could, if they earned it, pay 6¼ per cent., which was the rate now paid. The progress of the business was shown by the fact that whereas in 1903 the sale of gas amounted to 262½ million cubic feet, in 1913 it was 357¾ millions. The Broadstairs Company were incorporated in 1875, and obtained further powers in 1883 under a Provisional Order, and subsequently under further Acts in 1902 and 1903. Under the 1875 Act, the capital was £12,000 in ordinary shares, and £2000 in preference shares; under the 1883 Order, £20,000; under the 1902 Act, £9000; and under the 1903 Act, £60,000—making in all £103,000. The whole of the £12,000 of ordinary shares under the 1875 Act had been paid up, as well as £2000 of preference shares. Also all the capital under the 1883 Order and the 1902 Act had been raised, as well as £30,401 of the £60,000 authorized in 1903. Therefore, taken in the aggregate, £73,401 had been raised; leaving £29,599 still unissued, The total borrowing powers authorized were £27,697; and of this sum £13,000 was still available. The standard price was 4s. 4d., and the standard dividend was 10 per cent. on £6000 "A" stock, and 7 per cent. on the remainder. The slide per penny up or down was 5s. on part of the capital and 3s. 6d. on the remainder. The actual price charged in Broadstairs was 3s. 3d. Therefore the actual dividend payable was 13¾ per cent. on the 10 per cent. stock; on the 7 per cent., with the 5s. slide, 10½ per cent.; and on the 7 per cent., with the 3s. 6d. slide, 9¼ per cent. As a matter of fact, the Company had not earned sufficient to pay these dividends; the rates paid being 10 per cent. and 7 per cent., *plus* tax. However, there was no doubt that they would be able to pay more this year—indeed, the full amount under the sliding-scale. The first proposal under the Bill was that the Broadstairs Company should be transferred by agreement to the Isle of Thanet Company; and the moment for the amalgamation was an ideal one, both from the point of view of the consumers and that of the Companies. The Broadstairs Company used to manufacture on a site in the town near the coast, but had transferred the works to St. Peter's, where there was considerable land available for extensions. This transfer took place quite recently, although under an Act of Parliament it need not have been made until 1923. On the other hand, the Thanet Company's works in Margate were rapidly approaching their full capacity, whereas the demands necessitated extensions. Indeed, additional storage capacity was required immediately; but there was no room on the site. Further, there was very great difficulty in obtaining a site. Even could one be obtained, which was doubtful, the consent of the Margate Corporation had to be secured. Therefore the ground available at St. Peter's would permit not only of additional holder capacity, but of further extensions of plant to meet the growing demands in Margate. In these circumstances, the two Companies, who had the same Chairman, came together and entered into a provisional agreement to amalgamate; the terms of the amalgamation being set out in the second schedule of the Bill. It was not a case of an undertaking being sold in the ordinary sense for cash, but it was to be done by a transfer of shares on the following terms: The holder of every £100 of Broadstairs ordinary "A" stock would receive £192 10s. in Thanet stock; the larger amount being due to the fact that the former was 10 per cent. stock and the latter 3½ per cent. The holder of every £100 of Broadstairs "B," "C," and "D" 7 per cent. stock would get £140 of 3½ per cent. Thanet stock; and the 5 per cent. preference shareholders would get £106 for every £100. Provision was also made for the payment of £1000 to the Chairman of the Broadstairs Company and £600 to the Vice-Chairman; while two Directors would be taken over. Provision was also made for compensation to the officers not taken over. A new clause had been added to the Bill dealing with the price of gas; and this showed the advantage which the amalgamation would confer upon Broadstairs. From the date of transfer, the price of gas to be charged there for domestic use would be reduced from 3s. 3d. to 3s. 2d., and there would be a reduction of 1d. per annum until the price in Broadstairs was reduced to within 6d. of that charged in Margate. After this, the difference between the price in the two towns must not exceed 6d.; and from then both places would be dependent upon the sliding-scale. The new capital asked for was £150,000 in shares and one-third borrowing powers, subject to the auction clauses. Both opponents said that too much capital was being asked for; but he would be able to show that whereas it was usual for Parliament to grant a sufficient amount to carry a company on for from twelve to fifteen years, in this case the sum asked for would carry the Company on for only 8½ years. With regard to the application of the calorific value test, here the same policy would be followed, subject to the consent of the opponents, as in a large number of other Gas Bills of the present session—viz., to accept the result arrived at in connection with the Gas Light and Coke Company's Bill. There were a few miscellaneous provisions to which attention should be drawn. A slight alteration was being made with regard to the price charged for public lighting. Hitherto the Company had been under the obligation to supply the Margate Corporation with gas for public lighting at 5 per cent. below that charged to private consumers. In the first place, it would be necessary to make it clear that this was the price charged to private consumers in Margate. Under the Bill the Company were now going outside Margate; and the original provision only applied to Margate. In the second place, the Company desired to modify the clause so that the price charged for public lighting should be 5 per cent. below that charged to private consumers for lighting purposes. The point was that since the earlier Acts of the Company were passed there had been great development in the use of gas for power purposes, not then contemplated; and as the original intention was with regard to lighting, there could be no harm in making it specific. The position was that at present the Company could not offer low prices for power purposes, because if they did the Corporation could claim their gas at 5 per cent. less. The intention was not to alter the position against the Corporation in any way from what it was at present. The point was discussed in the Brentford Bill and granted, with the condition that the existing price for public lighting should not be increased. Another clause, which was somewhat novel, was the proposal to charge 6d. for special meter readings. In both Margate and Broadstairs, being holiday resorts, there were many short-term tenants; and the owners of the houses frequently came to the Gas Company and asked for a special meter reading, in order that they might know how much gas to charge the tenant. It was for this reason that the Company asked to be allowed to charge a fee not exceeding 6d. for meter readings which did not come within the ordinary business of the Company, who, of course, would continue to carry out

the ordinary quarterly readings for the purpose of rendering accounts. The two petitioners against the Bill were the Margate Corporation and the Broadstairs Urban District Council; and having regard to the fact that each said the Bill was all in favour of the other, he could not help feeling that the Company had hit off the half-way course. In the first place, Margate feared that the price there would be kept higher than it would be if the amalgamation did not take place, and, further, that the Broadstairs shareholders would receive a sum of £700 per annum more in dividends than if they remained separate. The fact was, however, that this year the Broadstairs Company had earned enough to pay the full dividends on their shares, and they would receive £500 more by remaining separate than they would under the amalgamation. Objection was also taken to the compensation to the Chairman, Vice-Chairman, and officers. Compensation to officers was quite the usual thing; and it would be very hard if it were not so. He agreed, however, that compensation to the Chairman and Vice-Chairman was not so usual, although there were instances in which it had been done, especially in cases of agreed amalgamations. In these circumstances it had been sanctioned by Parliament. Other points raised in the Margate petition were as to the price for public lighting, and the 6d. meter reading charge. Similar points were raised in the Broadstairs petition. One different point was the fear that less gas would be manufactured at the Broadstairs works, and thus derprive the Council of the *octroi* dues on the coal. On the other hand, Margate objected to more gas being made at the Margate works. All he could say was that there was no room for manufacturing more gas at Margate, and he could assure Broadstairs that not one foot less gas would be manufactured there. Indeed, the amount would be considerably greater than at present. Broadstairs also suggested that before the undertaking was sold to another concern, the Council should have the first option to buy. If this were an ordinary sale, he would agree; but it was merely an amalgamation by the exchange of shares. Another suggestion was that the price of gas should be the same throughout the whole area. To do this, however, would be a monstrous injustice to Margate, because the capital per 1000 cubic feet and the working charges at present in Margate were so very much less than in Broadstairs.

The Committee at this point adjourned until yesterday (Monday).

WADHURST AND DISTRICT GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Tuesday, April 21.

(*Before Sir* HARRY SAMUEL, *Chairman, Mr.* FRANCE, *Mr.* ORDE-POWLETT, *and Mr.* ROBINSON.)

This Bill is to authorize the purchase of the Ticehurst and District Gas Company (in liquidation) by a Mr. Venables and the incorporation of the Wadhurst and District Gas Company.

The promoters were represented by Mr. J. S. SCHOFIELD. There were three opponents: The Heathfield and Waldron Gaslight and Coke Company and the East Sussex County Council, represented by Mr. J. N. KEEN; and the owners of a small gas-works at Burwash (Messrs. Taylor and Sixsmith), represented by Mr. BEVERIDGE.

Mr. SCHOFIELD, in opening, said the Bill merely sought sanction to an agreement for the purchase of the undertaking of the Ticehurst Gas Company from the Receiver of the Company—an agreement already sanctioned by the Chancery Court; the purchaser being a Mr. Venables, who had the interests of the district very much at heart, and who desired to see the supply of gas placed on a satisfactory basis. The origin of the present position—which had been led up to by a great many purchases and sales at different times—was that in 1902, a Mr. Preston purchased a small private gas-works at Wadhurst, in East Sussex; and the same year he bought another small gas undertaking at Ticehurst. About the same time he came to Parliament and obtained the Wadhurst Gas Act of 1902. The limits of supply were Wadhurst, Ticehurst, Etchingham, Hurst Green, Salehurst, and Burwash; and the capital of the Company was fixed at £25,000, with £8000 of borrowing powers, all of which was raised. The same year, Mr. Preston formed a Water Company to deal with the same area, except the parishes of Wadhurst and Hurst Green. The two Companies were amalgamated in 1903, under the title of the Ticehurst and District Water and Gas Company; an Act of Parliament being obtained for the purpose in 1904. The district of Heathfield, however, was added to the area of supply for both gas and water. Gas was then supplied, and had since been supplied in Wadhurst and Ticehurst; but prior to the formation of the Ticehurst Company, the Directors formed the Gas and Water Works Supplies and Construction Company, Limited, with the object of exploiting the remaining parts of the area other than Wadhurst and Ticehurst—the Directors of the two Companies being the same. In February, 1905, an agreement was entered into between the two Companies, which purported to give the Construction Company the right of supplying gas in Heathfield; and immediately this agreement was signed, the Construction Company floated another Company called the East Sussex Gaslight and Coke Company—the Directors again being the same. In 1911, however, a person named Eaton formed the Heathfield and Waldron Gaslight and Coke Company, for the purpose of acquiring the gas undertaking of the East Sussex Company in Heathfield; and this Company was to-day supplying, but without statutory powers. Another agreement between the Ticehurst Company and the Construction Company, in June, 1905, purported to give the Construction Company the right to supply in Burwash; and immediately this agreement was signed, Eaton formed the Robertsbridge, Salehurst, and Hurst Green Water and Gas Company, which constructed a small works at Burwash, which were still in existence. In September, 1910, the works at Burwash, which had no statutory powers, were acquired by the Ticehurst Company. But in December of the same year they were sold to a Mr. Noakes, who subsequently sold them to the Weald and District Gas Company; and in January, 1913, this Company sold the works to Mr. Herbert Taylor and Mr. Sixsmith, who now owned and worked them, and who were petitioning against the Bill. The Ticehurst Company, which had gas-works at Wadhurst and Ticehurst, meanwhile, were always in financial difficulties; and in February, 1910, the debenture holders commenced an action, and a Mr. Beaby was appointed Receiver and later Manager of the undertaking. The water part of the Company's undertaking was about a year ago sold to the Heathfield Water Company; and now a provisional agreement had been entered into with a local gentleman, Mr. Venables, for the purchase of the gas-works of the Ticehurst Company—the agreed purchase price being £4000. This had been sanctioned by the Chancery Court; and it only awaited the consent of Parliament. As a matter of fact, Mr. Venables had actually taken over the works, and was managing them now. When the present Bill passed, the Wadhurst and District Gaslight and Coke Company would be formed. Dealing with the petitions against the Bill, Counsel pointed out that that of the East Sussex County Council was on clauses; and he would not deal with it at the moment. The Heathfield and Waldron Gaslight and Coke Company, as had been explained, came into existence under the agreement of February, 1905, as the result of the transfer of the Ticehurst Company's powers in the district—first to the Construction Company and then to the East Sussex Gaslight and Coke Company, from whom the present Heathfield Company purchased. This purchase, however, consisted of the gas-works and mains only, and not, of course, any statutory rights, as the Ticehurst Company could not part with any statutory rights without the consent of Parliament. The agreement of 1905 was revocable at the end of five years; but this was not done, so that it was in existence at the time Mr. Venables came on the scene. Hearing of the agreement, he thought it would be best that it should be got out of the way; and the Receiver and Manager, as he thought, gave notice determining it. A mistake, however, was made, and notice was given determining the agreement of June, 1905, with regard to the Burwash works, which, as a matter of fact, had already been determined some years ago. This mistake, however, was subsequently rectified; and the present position was that the Heathfield Gas Company and Messrs. Taylor and Sixsmith were supplying in the Heathfield and Burwash portion of the Ticehurst Company's area without statutory powers and without any agreement with the Ticehurst Company.

Mr. KEEN, for the Heathfield Company, said he had purchased from the Receiver of the East Sussex Gas Company, and was in the district supplying.

Mr. SCHOFIELD (continuing) said that it had always been Mr. Venables' intention to take over the whole of the statutory area of the Ticehurst Company; and if this could not be done, he would not be prepared to go on with the purchase.

The CHAIRMAN: The whole of the statutory powers in this area are really vested in the Ticehurst Company?

Mr. SCHOFIELD: Yes.

The CHAIRMAN: And are at present?

Mr. SCHOFIELD agreed that this was so.

Mr. BEVERIDGE: But I purchased my works from the Ticehurst Company.

The CHAIRMAN: You are a non-statutory Company.

Mr. BEVERIDGE said this was so.

M. SCHOFIELD, in conclusion, emphasized the point that none of the statutory powers of the Ticehurst Gas Company had been purchased.

Mr. *J. Venables*, J.P., living in Wadhurst, gave evidence supporting Counsel's opening statement. His sole idea in entering into this provisional agreement, he said, was to bring about an improvement in the supply of gas. At first, the price suggested was £6000; but eventually the figure of £4000 was agreed upon. The works, however, were in a very bad condition, and considerable expenditure would be necessary in order to put the undertaking upon a proper basis. He was quite under the impression that the Heathfield and Burwash agreements had been terminated, and that he was taking over the whole of the statutory rights and area of the old Ticehurst Company. Without this, he would not have continued the negotiations which resulted in the agreement. This was sanctioned by the Chancery Division, subject to confirmation by Parliament.

Mr. BEVERIDGE, cross-examining, ascertained that during the negotiations Mr. Venables knew of the existence of the gas-works in Burwash; but it was not suggested that the conditional agreement included the gas-works in Burwash now owned by Messrs. Taylor and Sixsmith, who bought them from the old Ticehurst Company. It was, however, said Mr. Venables, his intention to come into the district to supply, unless terms could be arranged with the present owners of the Burwash Gas-Works.

Mr. KEEN, for the Heathfield and Waldron Gas Company, also asked as to whether the new Company proposed to compete with the present non-statutory supply given in Heathfield, and received a reply more or less in the affirmative, "in the absence of any amalgamation or agreement."

Witness would not definitely state that he would compete.

Mr. KEEN put it that the mains of the Ticehurst Gas Company were ten miles away.

The CHAIRMAN: Was it your idea that you wanted the whole of this district to be supplied from one centre by one Company?

Witness: Yes.

And that you undertook the purchase in the hope of being able to consolidate with the other Companies, or come to some arrangement?—That was my idea.

Failing that you intended to compete?—Yes.

Mr. KEEN put further questions as to the fairness of this, in view of the fact that the Heathfield Company had purchased the works and goodwill of the Ticehurst Company in Heathfield, and had spent £2500 upon them, although, of course, the Heathfield Company had not purchased the statutory rights, which it could not do. The Heathfield Company, it was pointed out, is now giving a satisfactory supply at 4s. 9d. per 1000 cubic feet, which witness agreed was a reasonable price; and witness was asked how he could expect to compete with a 5s. 6d. standard price as proposed in the Bill.

The CHAIRMAN: I think that is a very poor argument. It seems rather against yourself, Mr. Keen.

Mr. KEEN continued his cross-examination as to the fairness of the new Company competing, having regard to the fact that the old Ticehurst Company had agreed that the Heathfield Company should give

the supply in the district, and now the successors of the Ticehurst Company wished to compete without buying out the non-statutory Company. It was claimed by Counsel that there is no case in which this has been allowed. In every case, it was said, the statutory company was compelled to purchase the non-statutory undertaking.

The CHAIRMAN: I think we must realize, in fairness to Mr. Venables, that he believed he was purchasing rights over the whole area.

Mr. KEEN: And was it for that reason you include Heathfield?

Mr. *Venables:* Of course.

In re-examination, Mr. Venables said this was not a case of asking for new powers in the area of a non-statutory undertaking. He was simply purchasing existing powers in an area granted to the old Company; and it was not fair that a new Company purchasing these rights from the debenture-holders should lose a portion of the territory.

Mr. *C. R. Beaby*, the Receiver appointed in the liquidation of the Ticehurst Company in 1910, said it was their intention all along to sell to Mr. Venables the whole of the powers of supply of the Ticehurst Company, including Heathfield and Burwash. It was quite an error that the Burwash agreement was put an end to, instead of the Heathfield agreement. As a matter of fact, the Burwash agreement had previously been determined, although no intimation to this effect was sent to him when the mistake mentioned above was made. The purchasers of the Heathfield and Burwash undertakings only purchased the works and mains.

In answer to Mr. KEEN, witness said he should regard the non-statutory Companies as trespassers.

Mr. KEEN: After we have paid £1600 for the works?

Witness: Yes, I do not think anything has been done which prevents the Ticehurst Company or its successors giving a supply, now that the agreement has been determined.

The CHAIRMAN: And you maintain that, if the Committee do not find the preamble of this Bill proved, you have powers, as the Ticehurst Company, to supply in Heathfield?

Witness: Certainly.

Mr. *Andrew Dougall*, a Past-President of the Institution of Gas Engineers, and General Manager of the Tunbridge Wells Gas Company, said his structural valuation of the two works of the Ticehurst Company at Wadhurst and Ticehurst was £5000; but an additional expenditure of £1500 would be necessary in order to modernize the works. The remaining £1000—making the capital of £7500—represented the costs of the present Bill. Later on it would be necessary to rebuild the works, and lay a considerable quantity of new mains in the outlying districts, having regard to the development now going on in parts of the area. Under the Bill, the new Company would be subject to the provisions of the sliding-scale, with a standard price of 5s. within two miles of the works and 5s. 6d. beyond. This he considered a reasonable standard price.

In answer to Mr. BEVERIDGE, witness said he had inspected the Burwash works, and considered them good ones for their purpose. Eventually, however, it would, he believed, be necessary to build one large works to supply the whole area. He did not suggest that there should be competition in Heathfield and Burwash, nor would he advise it.

Mr. KEEN called attention to the fact that Mr. Venables was getting the undertaking for £1000 less than Mr. Dougall's valuation; and he also pointed out that under the Bill Mr. Venables would take the whole of the £7500 of shares and would pay £4000 to the Receiver. There was, however, no provision that Mr. Venables was to spend the £1500 for bringing the works up to date.

The CHAIRMAN: The Committee would like more information on this point; and I will ask Mr. Venables to come back later.

Mr. KEEN further cross-examined Mr. Dougall, who said that there are 198 houses supplied with gas, out of 288 houses on the line of main in Wadhurst. In Ticehurst there are 108 houses supplied; and, roughly, about 78 per cent. of the houses on the lines of route in the area are supplied.

The CHAIRMAN: Does it not appear to be the simplest plan to purchase the Heathfield and Burwash Companies, and so complete the benefit to the district?

Witness: I suppose it would.

In answer to Mr. SCHOFIELD on this point, witness said that, unless the works could be purchased at a commercially possible figure, very little could be done. Mr. Venables could not purchase under the present Bill.

The CHAIRMAN: Has there been any attempt to purchase?

Mr. SCHOFIELD: No. Mr. Venables has, however, seen the works, but he could not give the figures of value mentioned, as what took place was without prejudice.

Mr. *Venables* was here recalled on the question of capital. He himself, he said, had to find the money for putting the works into modern condition. Already he had spent £600; and, owing to the difficulty of getting outside financial assistance, he would have to find the money himself.

The CHAIRMAN: In fact, you are the Company?

Witness: Yes; that is so.

In answer to further questions, Mr. Venables said he was willing to buy the Heathfeld and Burwash Companies on reasonable terms, by the issue of shares in the new Wadhurst Company.

Mr. KEEN cross-examined to the effect that the Bill did not compel Mr. Venables to spend a penny on the works, and that the Company would have to do it, although Mr. Venables would hold all the shares, except the £13,500 of additional capital under the Bill. Witness replied that he would himself most certainly have to find everything required, owing to the inability to get anybody else to put money into the undertaking. Mr. Keen therefore wanted a clause in the Bill making it incumbent upon Mr. Venables to find the money for extensions, &c.

The CHAIRMAN said the Local Government Board had reported to this effect; and there should be something in the Bill making it clear that Mr. Venables must find the money. The Committee would have to be satisfied on this point.

Mr. SCHOFIELD, for the promoters, said this should be made perfectly clear in the Bill.

This closed the case for the promoters.

Mr. BEVERIDGE, addressing the Committee on behalf of Messrs. Taylor and Sixsmith, the present owners of the Burwash Gas-Works, did not differ materially from the account given by Mr. Schofield of the complicated negotiations which had brought about the present position, although he mentioned one or two other persons who had also been interested for very brief periods. His point was that, except from the September to December of 1910, when the Ticehurst Company held and operated the Burwash works, the Ticehurst Company had never supplied gas in the district, and it seemed to him that the desire of Mr. Venables was to get the whole of the statutory powers over the area transferred to him so that he could, in ordinary parlance, squeeze the present owners out. He knew of no case where a statutory authority had been allowed to compete with a non-statutory authority. In every case purchase had been put upon the statutory authority. In this instance, however, purchase was not desired. The owners of the works were quite satisfied, and the consumers were quite satisfied; and he asked the Committee to strike Burwash out of the Bill.

Mr. *W. Bennett*, a solicitor of Burwash, gave evidence as to the title of Messrs. Taylor and Sixsmith to the Burwash works.

The CHAIRMAN: What is the price you paid for them?

Mr. BEVERIDGE: With great respect, Sir, I hope you will not press your question. It rather suggests that you intend putting in a purchase clause, and I really hope you will not.

The CHAIRMAN: I really think that, with the extraordinary transactions in this case, the Committee ought to know all about it.

Mr. BEVERIDGE: It would be rather hard if, in case of arbitration, this price were known beforehand.

The CHAIRMAN: Very well, I will not press it.

Mr. SCHOFIELD cross-examined to the effect that Messrs. Taylor and Sixsmith could not claim to have purchased any statutory rights; and to this witness agreed.

Mr. *Herbert Taylor*, one of the purchasers of the Burwash Gas-Works, said that when these were taken over in March, 1913, the output of gas was 400,000 cubic feet; but in March of the present year it was 1,200,000 cubic feet.

In cross-examination, witness agreed that he did not buy any statutory rights, and that if Mr. Venables financed the Ticehurst Company instead of purchasing it, the Company could compete to-morrow.

The CHAIRMAN: I should like to make this quite clear. Were you aware that the Ticehurst Company had the power to compete at any time?

Witness: Yes.

Therefore you bought the works knowing the risk?—Yes.

Two local witnesses were next called as to the good quality of the gas supplied; and this closed the petitioners' case.

Wednesday, April 22.

Mr. KEEN this morning proceeded with his case for the Heathfield and Waldron Gaslight and Coke Company—calling evidence first.

Mr. *Percy Wenham*, the Secretary to the Company, spoke as to the purchase of the East Sussex Company's undertaking from the Receiver, for the sum of £1630—the purchase including the works, plant, and goodwill of the East Sussex Company. The works were then in a very poor condition; and considerable expenditure was incurred in improving both the works and the mains. At present all the populous parts of Heathfield and Waldron were supplied. The total capital expenditure upon the undertaking to the end of 1913 was £4294; and there had been a progressive increase in the undertaking since the Heathfield Company came into existence.

Cross-examined by Mr. SCHOFIELD, witness said he was aware that the Heathfield Company had no statutory powers. Counsel also put it that whereas the Construction Company in its agreement with the East Sussex Company arranged to pay 4d. per 1000 cubic feet to the East Sussex Company, the Heathfield Company, as successors in title, did not seem to hold them under a similar liability.

The CHAIRMAN: Were you aware, when you bought, that you would be selling gas practically under a licence?

Witness: No, I was not aware of it; it is not shown in our title.

In further answer to the CHAIRMAN, witness said that nobody in the Heathfield Company had, at the time of the purchase, any knowledge of the statutory powers of the Ticehurst Company. Knowing of these powers now, he did not think there was any substantial risk of competition from the Ticehurst Company as such. Under the Bill, however, there was serious risk of competition. Witness added that the Heathfield Directors had discussed the question of obtaining statutory powers themselves, but had not gone into it far enough to institute inquiries to ascertain whether any other company had statutory powers.

The CHAIRMAN said the Committee were very anxious to find out the date when the Heathfield Gas-Works were first built.

Mr. *Venables* (recalled) said that works for dealing with natural gas existed in 1902. The Ticehurst Company did not get its statutory powers until 1904; and this seemed to raise the point that the Heathfield Company, as successors in title, could not be supplying under licence from the Ticehurst Company. The pipes at present in service were those used for the supply of natural gas.

The CHAIRMAN said that from this the Committee must infer that there was a gas-works in Heathfield before the Ticehurst Company was incorporated.

Mr. SCHOFIELD reminded the Committee that no gas would be manufactured, and that the supply of natural gas might cease at any time.

Mr. KEEN, addressing the Committee, asked for the exclusion of the parish of Heathfield from the Bill, or, alternatively, that the new Company should purchase the Heathfield Company or keep out of the district. Certainly if Burwash was struck out, then *à fortiori* Heathfield should go, because Burwash was the connecting link between Ticehurst and the remainder of the area and Heathfield. As to the

position of the Heathfield Company, it never consented to take over any of the obligations of the agreement between the Construction Company and the East Sussex Company. They bought the undertaking in the open market from the Receiver of the East Sussex Company, just as any other undertaking might be purchased from a receiver. Looking into the agreement, however, it provided that the Ticehurst Company could not terminate the agreement and get back the powers to supply; it must compensate the Construction Company for taking away the right of supply. If the agreement were not terminated, then the Ticehurst Company could not supply in Heathfield. Thus, the Ticehurst Company was not to supply in Heathfield, or if it did, then it had to buy back the right. He contended, however, that the agreement had nothing to do with the Heathfield Company. To give the new Wadhurst Company the right to supply in the existing area was a totally different thing to the continuance of the same powers in the hands of the moribund Ticehurst Company; and it would be a great hardship on the Heathfield Company, in the circumstances, to inflict competition upon it. The whole position was in the hands of Parliament to do justice between the parties.

Mr. SCHOFIELD, replying for the promoters, dealt first with the suggestion that Burwash should be struck out of the area. The witnesses for Burwash had admitted that they knew they had not bought any rights of gas supply, but only works and mains. The owners of the works had bought them for £400, knowing the risk they ran of competition from the Ticehurst Company; and it was a strange application to ask the Committee to relieve them of the risk simply because the Ticehurst Company were selling to another Company. With regard to the Heathfield Company, they were successors to the East Sussex Company, which worked under the condition that they could be turned out of the district by merely terminating the agreement of 1905; and he maintained that the Heathfield Company were in the same position. If, as they had done, they repudiated the agreement, what was their position? They were simply trespassers in the district, and had "jumped" the territory of the Ticehurst Company. It was said that the Heathfield Company had no knowledge of the existence of the Ticehurst Gas Act of 1904; but no Director of the Heathfield Company had been called before the Committee, and it was inconceivable that the Directors really did purchase the works without knowing that the statutory powers of the Ticehurst Company existed. It had been said that the Ticehurst Company had not exercised their powers in Heathfield and Burwash; but it must not be overlooked that gas was supplied in these two districts, although not directly by the Ticehurst Company. If the Committee were to strike out any parish, or add any proviso to it, then it was no longer an agreement, and the Ticehurst Company would be thrown back into the position it was in before the conditional agreement was entered into—a deplorable state of affairs. In regard to the purchase of the works in Burwash and Heathfield, Mr. Venables was willing to meet the parties; but it was impossible to provide for purchase in this Bill, as the Heathfield Company was a limited Company, and certain meetings were necessary. Nevertheless, Mr. Venables was prepared to go into the matter, and see what could be done. If the Committee passed the preamble of the Bill unconditionally, the Burwash and Heathfield undertakings would not be injured, and they could come to Parliament for statutory powers, although it was to be noted that in neither case had a pledge been given to this effect.

Mr. KEEN said the Heathfield Company were prepared to apply for a Provisional Order next year.

Mr. *Taylor* said his disposition was to do the same.

The CHAIRMAN [to Mr. Keen]: On the question of coming to an arrangement, you have nothing to say, I suppose. The Committee are strongly of opinion that this matter ought not to have come here at all—there ought to have been some arrangement.

Mr. KEEN: We did our best.

The CHAIRMAN: We are anxious to get the exact figures of the expenditure upon the Burwash undertaking. I understand £400 was paid for the works.

Mr. *Taylor*: Yes.

The CHAIRMAN: Any other expenditure?

Mr. *Taylor*: £300 on the works and £200 for the freehold, making £900 in all. He added that he had never been approached officially with regard to a sale of his works in Burwash, nor did he have any official intimation as to the Bill.

The CHAIRMAN: This seems a most surprising case.

Mr. SCHOFIELD, for the promoters, disputed this statement of Mr. Taylor's, and asked that he should be recalled to the witness chair with regard to certain correspondence and interviews in which a price for his works was mentioned.

Mr. *Taylor* gave evidence on the point, when he explained that he meant he had not been approached before the Bill was introduced.

Mr. SCHOFIELD said Mr. Venables did not consider that he had to approach anybody before the Bill was deposited; but immediately the petitions against it were deposited, interviews took place.

The Committee room was then cleared. On the parties being readmitted,

The CHAIRMAN, in giving their decision, said the Committee, after careful consideration, were unanimously of opinion that the preamble of the Bill was proved subject to certain alterations. They were of opinion that the area from Wadhurst to Burwash should be the area of supply of the Company. They were also of opinion that, considering the money spent by Mr. Taylor, he should be paid the sum of £1000 for the Burwash Gas-Works. The Committee were also unanimously of opinion that Heathfield should be excluded from the Bill; and the reasons specially for this were the long distance Heathfield was away from the other area of supply, and the fact that Heathfield and Waldron were one district, and that Waldron did not come into the Ticehurst Act of 1904.

Mr. SCHOFIELD, for the promoters, said it would be necessary to consider the position; and he asked permission to mention the matter later in the day.

After lunch, in answer to a question,

The CHAIRMAN said the sum of £1000 to be paid to Mr. Taylor was for the Burwash undertaking, "lock, stock, and barrel."

Mr. SCHOFIELD remarked that the whole matter required very careful consideration by Mr. Venables; and he asked that the Bill might stand over until a later day.

The CHAIRMAN agreed to this, and the Committee then proceeded with other business.

ST. ANNE'S-ON-THE-SEA IMPROVEMENT BILL.

This "Omnibus" Bill was considered last Tuesday by Section "B" of the Local Legislation Committee, presided over by Mr. GARDNER.

Mr. COCKSHUT appeared for the promoters. There was no opposition to any part of the Bill.

Part V. provides for the purchase of the St. Anne's-on-the-Sea Gas Company, which was incorporated by the St. Anne's-on-the-Sea Gas Act, 1898, and is supplying gas in the district at the present time. Clause 24 provides that the Council may, within two years, with the sanction of the Local Government Board, purchase the Gas Company's undertaking upon agreed terms. An additional clause with regard to the manufacture of fittings was inserted in the Bill, as follows:

> Notwithstanding anything contained in the St. Anne's-on-the-Sea Gas Act, 1898, the Council shall not manufacture meters, pipes, lamps, tubes, burners, or other gas-fittings, engines, machinery, stores, ranges, and other apparatus and things for warming, lighting, cooking, ventilating, or producing motive power by gas.

Clause 27, which provided for the maintenance of the undertaking by the Gas Company till the date of transfer (the consent of the Council being necessary for any further capital expenditure, or before entering into "any new contract, agreement, or obligation, except such as shall be in the ordinary course of the maintenance of the works and proper conduct of the undertaking"), has been withdrawn.

RHONDDA AND SWANSEA BAY RAILWAY BILL.

A Pipe Protection Clause.

This Bill, which was before a Select Committee of the House of Commons last Tuesday, contains the following clause for the protection of gas and water mains of local authorities. There was no opposition to it:

> The provisions of sections 18 to 23 of the Railway Clauses Consolidation Act, 1845, shall, for the purposes of this Act, extend and apply to the water and gas mains, pipes, and apparatus of any local authority, and shall be construed as if "local authority" were mentioned in those sections in addition to "company or society:" Provided that any penalties recovered under section 23 shall be appropriated to that fund of the local authority to which their revenues in respect of water or gas (as the case may be) are appropriated.

DUMBARTON WATER AND GAS ORDER.

Under the Private Legislation Procedure (Scotland) Act, 1899, Mr. J. D. Hope, M.P., has been appointed one of the Commissioners to inquire into Group B of Draft Provisional Orders. The official minute issued on Monday, the 20th inst., gave particulars of the applications for Provisional Orders lodged at the office of the Secretary for Scotland on the 17th inst.

It states that the Dumbarton Water and Gas Order asks for powers for the Provost, Magistrates, and Council of Dumbarton to construct additional water-works, to alter the quality of gas supplied by them, and to confirm an agreement as to the supply of electricity in the burgh. Increase of population and the expansion of industrial enterprise have, it is said, rendered it necessary to augment the water supply; the cost for this section of the Order being estimated at £25,000. This covers a reservoir and embankment in the parish of Old Kilpatrick, on the site of the Old Dam on the upper reaches of the eastern branch of the Milton Burn. In regard to the portion of the Order which relates to gas lighting, the Council deem it expedient that they should be authorized to reduce the illuminating power of the gas supplied by them, and that further provision should be made for testing such illuminating power. They also ask confirmation of the agreement come to between the Town Council, the Electric Supply Corporation, Limited, and the Clyde Valley Electrical Power Company. It is proposed that the quality of the gas supplied by the Council shall be, with respect to its illuminating power, such as to produce at the testing place when burned at the rate of 5 cubic feet per hour a light equal in intensity to 14 sperm candles of six to the pound. The Council ask borrowing powers for £25,000 in respect of the water scheme; and in respect of gas they ask that the Act of 1873 shall be amended so as to read as if the sum of £15,000 mentioned therein were £70,000.

Ashington and Hirst Gas Bill.—A public meeting under the auspices of the Ashington and Hirst Ratepayers' Association was held last week in furtherance of the Gas Bill being promoted by the Ashington Urban Council. A resolution was duly moved affirming the confidence of the meeting in the Bill, which has already passed the Commons Committee, and expressing indignation at the methods which were being used to defeat it. The resolution further mentioned the unsatisfactory state of the present lighting system, and considered that the only way was the establishment of gas-works under the Council. After discussion, the resolution was carried unanimously; and it was also decided to offer to the Council to send a representative to appear in support of the Bill when it comes, as it soon will do, before the Committee of the House of Lords.

LEGAL INTELLIGENCE.

NEW TREDEGAR GAS AND WATER COMPANY, LIMITED.

Last Tuesday a summons taken out by the Liquidator of this Company, to obtain a decision guiding him in the distribution of surplus assets, came before Mr. Justice Astbury. The Company was formed in 1873 with a nominal capital of £4000, divided into 800 £5 shares; and from time to time the capital had been increased until it reached a total of £13,000. In September, 1910, the property was sold to the Local Authority for £23,000; and in October, 1912, resolutions were passed for winding up. The Liquidator paid all debts and liabilities, and returned 20s. in the pound on all the shares, and there now remained for distribution the sum of £8040. Some question had arisen as to whether part of the increased capital had been validly issued; it being stated that no resolution had been passed authorizing its creation. During the course of the hearing, the minute-book was produced; and it was found that there was a resolution authorizing one issue. Thereupon his Lordship ordered the summons to stand over generally, and directed that the solicitors should carefully examine the minute-book to see whether resolutions had been properly passed in each case.

WORKMAN'S COMPENSATION CASE AT LONG EATON.

Injury or Rheumatism?

The Long Eaton Gas Company were respondents in a workman's compensation claim which was heard at Derby last Wednesday, when James Melbourne, a labourer, of Breaston, applied for an award under the Workmen's Compensation Act.

Mr. FLINT, who appeared for the applicant, explained that on Nov. 27, 1912, he was assisting to lift a radiator, and sprained his back; the result being that he was incapacitated from work until November of last year. Respondents contended that the man was now able to do light work, and that his incapacity was not due to the accident, but to rheumatism which had not arisen out of the injury to the back.

Applicant, who is 55 years of age, said in April last, on the advice of Dr. Parry Jones, he went into the Derbyshire Royal Infirmary; but came out after nine days' treatment, and subsequently underwent X-ray treatment at Nottingham Hospital. He declared that he was worse when he came out of the infirmary than when he went in. He was unable to do the work offered him. Compensation was stopped in November last; and his Society were now backing his proceedings.

Cross examined by Mr. BERRYMAN, for the respondents, applicant said he had never had rheumatism or rheumatic fever in his life. While in the infirmary they took out nine of his teeth against his will. He was afraid they would take more out if he stopped there.

Mr. BERRYMAN: Do you say that the doctors at the infirmary did not treat you properly?—That was my opinion?

Do you know it was their intention to send you to the Devonshire Hospital at Buxton, where they specially treat rheumatism?—Yes.

And you refused the treatment?—Yes.

Dr. *Latham* said applicant suffered from a rupture of the muscles of the back, and now had disease of the spine.

Dr. *Bean* gave similar evidence, but admitted that he thought applicant had not made any great effort to recover.

Dr. *Parry Jones*, for the defence, said that when he examined applicant the man was also physically ill, and he advised him to go into the infirmary; and had the patient continued the treatment prescribed, he would have recovered. Witness applied many tests to him, and came to the conclusion that he was not trying to recover, and was quite capable of doing light work. The teeth were removed at the infirmary in consequence of the foul condition of the man's mouth, which was sometimes a cause of rheumatism.

Dr. *Luce* said the man was suffering from stiffness of the muscles from disuse.

Dr. *Bloomer* also said that light work would be beneficial, as the man was suffering from general inertia.

His HONOUR (Judge Alan Macpherson) announced that, in conjunction with Dr. Vaudrey, the Medical Assessor who accompanied him, he had come to the conclusion that when work was offered to the applicant in April last year he was incapable of doing it; but now he was, and had been for some time, capable of working. This produced a difficulty the solution of which he found by deciding to adjourn his decision for two months, when he would give his final judgment, which would depend upon what took place between the parties in the meantime. He had carefully considered the medical evidence, and found as a fact that the applicant had not suffered any injury to the spine, but there was a lesion of the muscles occasioned, beyond dispute, by the accident. While he thought that there was some local rheumatism, he was of opinion that it was not due to any injury of the spine. The man's present condition, he concluded, was due to the fact that he had not exercised his muscles. If he had gone on with the treatment prescribed, he would have recovered his former health; and so far as he (the learned Judge) was at present advised, he saw no reason to doubt that the man might thoroughly recover in a very little while.

Charge of Attempted Arson.

The case in which Catherine Pemberton, a boarding-house keeper, was charged with attempting to set fire to a house by causing an escape of gas in a cellar [*ante*, p. 204], was before the Eastbourne Borough Bench again on two days last week. At the conclusion of the case for the prosecution, evidence was given by a boy in the employ of the Gas Company, who said that some weeks ago, when engaged on other work, he was asked by defendant's sister to stop a leak in the pipe in the cellar in question. He did so; and the escape being so small, he did not think it worth while to report the matter to the Company. The Magistrates were of opinion that there was no case for trial.

MISCELLANEOUS NEWS.

EXAMINATION IN "GAS ENGINEERING."

The City and Guilds of London Question Paper.

The following were the questions put to candidates last week in the first of the examinations in subjects connected with the gas industry which are held annually under the auspices of the City and Guilds of London Institute. The questions were in "Gas Engineering," and the Examiner was Mr. Thomas Glover, of Norwich. Candidates were directed to confine themselves to one grade only, and not to attempt to answer more than eight questions in the four hours allowed. The maximum number of marks obtainable is appended to each question.

GRADE I.

1. Draw a longitudinal section of a retort-setting, showing the manner in which moulded retorts are supported, with measurements as to spacing and thickness of the walls. [40.]

2. Describe the method of clinkering a producer, and discuss the more important points to be observed to ensure satisfactory working. [35.]

3. What points other than high temperatures are to be observed in retort-house practice for the production of large makes per ton of coal? [35.]

4. How is the presence of nitrogen in coal gas to be accounted for? What is its effect upon the calorific value and illuminating power of the gas? [35.]

5. Sketch a set of water-cooled condensers, indicating the passage of the gas and water, and showing how the condensates are removed. What points determine the dimensions of the apparatus for removal of the condensates? [40.]

6. In what way is ammoniacal liquor used in the process of purifying the gas from impurities other than ammonia, and how is the liquor ordinarily utilized in this connection? At what temperature should scrubbers be worked, and why is the temperature of importance? [35.]

7. Sketch and describe a form of centre valve for working a series of four purifiers with which you are acquainted? [40.]

8. The CO_2 content in water gas is found to be excessive. To what causes may this be due, and what are the remedies? What do you consider a reasonable percentage in carburetted water gas and blue water gas respectively? [40.]

9. Give a description and sketch of a vacuum recording gauge, and state for what purpose it is used. [30.]

10. State what you know of the more important qualities required in firegoods for use in the construction of retort-settings. What chemical constituents give the desirable properties to fire-bricks, and what compounds tend to diminish their refractory qualities. [40.]

FINAL EXAMINATION.

1. In what way does the destructive distillation of coal differ from the simple distillation of a complex liquid? [35.]

2. What do you understand by "local heating" in a retort-setting? To what causes may it be due? Discuss the points to be observed in the design to avoid uneven and local heating. [35.]

3. State the methods for determining the suitability of a sample of oil for carburetted water gas manufacture. [35.]

4. What influence has the composition of town gas upon (*a*) the rate of combustion, (*b*) calorific value, (*c*) flame temperature? [35.]

5. The crown of a three-lift gasholder is 130 feet in diameter, the pressure thrown by the holder being 10 inches water-gauge when fully inflated. Calculate the weight of the holder in tons. Of what depth should the cups of such a holder be made? [45.]

6. Describe the various fittings and mountings usual on steam-boilers to ensure safe working, as ordinarily used on gas-works steam plant, and discuss the more important points to be observed to prevent accidents. [40.]

7. The relief holder of a water-gas plant throws 4½ inches pressure, and the washer of the plant is 6 feet in diameter. To what depth must the main from the superheater to the washer be sealed to withstand the holder pressure during the "blow," the main being 18 inches in diameter, and what margin of safety would you allow? [35.]

8. Two fire-clays have the following compositions:—

No. 1.		No. 2.	
Silica	63·48 per cent.	Silica	97·53 per cent.
Ferric oxide	0·96 ,, ,,	Ferric oxide	1·42 ,, ,,
Lime	1·47 ,, ,,	Lime	0·18 ,, ,,
Alumina	22·51 ,, ,,	Alumina	0·75 ,, ,,
Magnesia	0·59 ,, ,,	Potash	0·08 ,, ,,
Moisture	10·99 ,, ,,	Soda	0·04 ,, ,,

Discuss the relative merits of these clays for the manufacture of refractory material as applied to retort-settings, and state broadly what constitute the chief characteristics of materials suitable for withstanding high temperature, and for retort construction. [40.]

9. Write a short account of modern purifying practice by oxide of iron, and discuss the various points for consideration to ensure economical working, and the possibility of making the process a source of revenue. [40.]

or, State what you know of recent proposals and processes for the reduction of sulphur compounds, other than H_2S, present in coal gas, where oxide purification only is practised. [40.]

10. Discuss the dangers and ill-effects of a leaky blast valve on the generator of a carburetted water-gas plant. [30.]

CARBON MONOXIDE IN CARBURETTED WATER GAS.

The National Chamber of Trade Deal with the Subject.

The Annual Conference of the National Chamber of Trade was held at Blackpool yesterday (Monday) week, and was attended by 250 delegates representing traders' organizations in various parts of the country. The business sessions lasted a full day; and no fewer than thirty-seven resolutions were placed on the *agenda* for consideration. One of these resolutions, which was forwarded to the conference by the Barrow-in-Furness Chamber of Trade, was in the following terms:

> "That this Chamber is strongly of opinion that some reasonable legislative restriction should be placed upon the present unlimited amount of the highly poisonous gas, carbon monoxide, which may be present in the mixture of carburetted water gas and coal gas now being supplied by many gas manufacturers for lighting, heating, and cooking purposes in houses and shops, and requests the Government, in the interests of the public health, to seriously consider the desirability of adopting the restrictions and safeguards recommended in the report of the Departmental Committee on the manufacture and use of gases containing a large proportion of carbon monoxide (1899)."

The mover of the resolution was Mr. R. Spencer, F.C.S., a Past-President of the Barrow-in-Furness Chamber; and the circumstances under which it came to be brought before the National Conference are rather interesting. Some time ago the Corporation of Barrow made application for permission to borrow money for new gas-works; and a Local Government Board inquiry was duly held into the matter. The Barrow Chamber of Trade, which has a membership of more than 200, deputed Mr. Spencer to attend the inquiry. In the course of the proceedings the Gas Manager mentioned that they were making about half a million cubic feet of carburetted water gas per day at the existing gas-works, and about a million cubic feet of coal gas; and it was added that it was proposed at the new works which were projected to put down plant capable of making an additional half million cubic feet of carburetted water gas, and ultimately a million. Mr. Spencer inquired what they did with this carburetted water gas; and the reply was that it was mixed with the coal gas. Mr. Spencer, who had heard complaints locally as to bad gas and fluctuations in the pressure, knew that the mixture was of a "poisonous character," and that there was some danger to the domestic user of it; and he determined to look into the matter more closely. He went through the report of the Departmental Committee formed in 1898, and, later, perused the "Gas Undertakings Returns" recently issued. This paper gave details of the gases, the amounts of carburetted gas, the amounts of coal gas, and the proportions which were used in mixing, together with the maximum mixtures made in 1913. The tables showed that the maximum in 150 companies and corporations mixing carburetted water gas and coal gas varied from 2¼ per cent. to 67 per cent. Mr. Spencer communicated with the Home Office on the matter, and was informed that there was no statutory limit to the amount of carbon monoxide which might be present in the mixture of carburetted water gas and coal gas supplied for domestic purposes. The Home Office also said that they were not aware of any restrictions having been placed in any Provisional Orders. The matter was brought forward at a meeting of the Barrow Chamber of Trade, the members of which body decided that it was of such importance as to warrant its inclusion among the subjects down for consideration at the annual conference of the National organization.

Mr. Spencer, in a statement which he had prepared to introduce the resolution, said that in February, 1898, the Home Secretary (Sir M. W. Ridley) appointed a Committee to inquire into the manufacture and use of water gas and other gases containing a larger proportion of carbon monoxide. This Committee, after an exhaustive inquiry and numerous experiments, reported in 1899. It was to this report and its recommendations that he (the speaker) wished to draw attention. At the time the Committee made its report in 1899 there were only 19 bodies in the British Isles manufacturing carburetted water gas; while according to the returns made to Parliament last month there were now 150 bodies manufacturing this gas for domestic purposes, of which 49 were corporations and urban district councils. In many cases probably the consumers were quite ignorant of the dangerous nature of the gas that was being supplied to them. The danger arose when the carburetted water gas was allowed, by accident or leakage, &c., to pollute the air which was inhaled by human beings, either awake or sleeping. The poisonous agent in the carburetted water gas was the carbon monoxide which it contained. This ranked as the most dangerous of poisonous gases. The poisonous gas was present in ordinary coal gas to the extent of about 6 per cent.; in water gas to the extent of about 40 per cent.; and in carburetted water gas to the extent of about 30 per cent. Carburetted water gas was manufactured for the purpose of mixing with ordinary coal gas. But there was at present no recognized standard for mixing gases. There was thus a mixing of carburetted water gas containing 30 per cent. of carbon monoxide with ordinary coal gas already containing 6 per cent. of carbon monoxide, at 150 out of the 848 gas-works in the British Isles, and there was no statutory limit to the amount which might be contained in the gas supplied for domestic uses. Experiments had proved conclusively that an atmosphere containing ½ per cent. of carbon monoxide would be fatal if inhaled, and would be dangerous long before such a degree of pollution was reached; and it was certain that constant exposure to small leakages of carburetted water gas would be prejudicial to health. The degree of pollution of the atmosphere in any room would, of course, depend upon the amount of the leakage, its duration, the nature of the escaping gas, the state of ventilation, and the size of the room. The danger of pollution by the carburetted water gas might arise in various ways—from leakages caused by (1) poor gas-fittings, taps, brackets, joints, chandeliers, &c.; (2) the use of slot-meters, where jets were in several rooms, and where the renewed flow of gas took place without the taps having been meanwhile turned off; (3) the variations and erratic fluctuations of the gas pressure, so that bye-pass jets of bunsen burners used for cooking and heating were put out unknown to the consumer; (4) various accidental means; (5) breakages in the mains: and (6) there was the danger arising from a criminal use of such an easily accessible poison. Mr. Spencer mentioned that the fluctuations of pressure were largely due to the condensation to the liquid state in the mains and service pipes of the volatile hydrocarbons used in the manufacture of the carburetted water gas.

The Committee, proceeded Mr. Spencer, were unanimously of opinion that the poisonous action of coal gas and water gas was due solely to the carbon monoxide they contained; that the higher the proportion of carbon monoxide the greater the poisonous property of the gas; and that, given equal conditions as to size of room, ventilation, flow of gas or length of exposure, &c., the danger to life from an escape of carburetted water gas or of coal gas mixed with any considerable proportion of water gas was far greater than that from an escape of ordinary coal gas. The danger, in fact, increased at a much greater ratio than the proportion of carbon monoxide. The Committee considered that the unrestricted distribution and use of carburetted water gas would constitute a substantial danger, and submitted that it ought to be prevented. They added that it was not desirable to give facilities for the use of deadly poisons. As to the prevention of danger, the Committee stated: "The most direct, and in our opinion, the only effective, method of preventing danger from water gas is to fix a limit which the carbon monoxide in a public and domestic gas supply shall not, in ordinary circumstances, exceed." After giving his audience a condensed summary of the seven chief recommendations as made by the Committee, Mr. Spencer, in conclusion, said he had endeavoured to place before the conference such facts and statements as he hoped might induce the National Chamber of Trade to exercise its influence in the direction indicated in the resolution, in the interests of public health, and might in other ways do a public service by drawing attention to the dangers that might arise where an admixture of coal gas and carburetted water gas was supplied for domestic purposes.

Mr. G. C. Britton, of Ripley, seconded the resolution; and, the conference being pressed for time, it was adopted without discussion.

SINGAPORE GAS SUPPLY LAST YEAR.

We have received from the Gas Engineer to the Municipal Commissioners of Singapore (Mr. J. P. Hallaway) his report on the working of the gas undertaking in the year ended Dec. 31 last. He was not responsible for the twelve months, as he had been in England on long leave of absence, and did not return to Singapore till the 4th of April last year. In his absence the works were in charge of his Assistant (Mr. Arthur M. Thompson), who presented the report for the year 1912. He was granted a year's relief from his duties, and left for Europe on the 25th of September.

Dealing first with the works and plant, Mr. Hallaway states that a contract was entered into with Messrs. Robert Dempster and Sons for the erection of an installation of vertical retorts on the intermittent system, together with the necessary coal and coke handling plant. It will be equal to the production of a million cubic feet of gas per day, or 750,000 cubic feet with one setting in reserve. As the present output is less than 500,000 cubic feet daily, the new plant will allow of an increase of 50 per cent. without using the old retorts. The existing condensers only being capable of dealing effectively with less than half the present make of gas, a new set of six, of the annular type, having a capacity of 800,000 cubic feet of gas per day, has been erected by Messrs. Clayton, Son, and Co., Limited, of Leeds, who carried out the work in a very satisfactory manner. In order to cope with the increasing demand for gas, it was decided to erect a holder of 600,000 cubic feet capacity; and the contract was placed with the firm just named. It was completed on the 31st of December; and Mr. Hallaway says "the contractors are to be congratulated on the efficient way in which they have carried out the work." Gas will be pumped into the holder from the works by means of a steam-driven compressor capable of delivering 40,000 cubic feet of gas per hour at a pressure of 6½ lbs. per square inch through a 6-inch steel main. The compressor and engine were supplied by the Bryan Donkin Company, Limited, of Chesterfield. With the view of increasing the pressure of gas in districts remote from the works, high-pressure plant, consisting of two 20,000 cubic feet per hour gas-driven compressors, has been erected at the gas-works. These compressors deliver gas at a pressure of 5 lbs. per square inch into a 5-inch steel main three miles in length, which is connected at various points to the supply mains, and the pressure increased to the desired degree.

Turning to the manufacturing operations, the quantity of coal carbonized last year was 11,772 tons; and the production of gas was 152,875,500 cubic feet—an increase of upwards of 23 million cubic feet, or 17·7 per cent., compared with 1912. The gas sold for private consumption amounted to 96,239,648 cubic feet, or 62·5 per cent. of the quantity sent out; being an increase of 23 per cent. on 1912. This was in great measure due to the higher pressure maintained in the district, whereby a more satisfactory supply was given. The gas used for public lighting was 44,561,936 cubic feet, or 29·4 per cent. of the outsend. The gas made per ton of coal was 12,986 cubic feet, of which 12,125 cubic feet were sold; the coke made was 6890 tons, or 11 cwt. 7 qrs. per ton; and the tar made was 137,902 gallons, or 11·7 gallons per ton.

In the report submitted by Mr. Thompson for the year 1912 he did not give any particulars in regard to the profit made, as the figures were not available. Mr. Hallaway says it was $175,098; and after deducting interest, sinking fund, and depreciation charges, there remained a net balance of $126,000, equal to a profit of 24 per cent.

The Huntingdon Gas Company have placed an order with Messrs. Biggs, Wall, and Co., for an installation of their "Rapid" manual charging machine.

ARTIFICIAL GAS INDUSTRY IN THE UNITED STATES.

Its Importance to the Public.

At the Meeting of the Southern Gas Association at Mobile (Alabama) at the close of last week, a paper was submitted by Mr. JOHN W. LANSLEY, of Chicago, on "The Industrial Position of Artificial Gas." The author has courteously forwarded to us a copy of the paper; and as it furnishes proof of the great relative importance of artificial gas as a manufacturing industry, the cheapness of gas service, and the stability of gas securities, we give it in its entirety.

In the hundred years that have elapsed since David Melville, of Newport, R.I., secured a patent for his coal gas apparatus, in 1813, the artificial gas industry has grown to be one of the largest in the United States. The census of 1910 discloses that in capital invested it ranks third; being exceeded by iron and steel manufactures, and lumber and timber products only.

Its remarkable development in a single decade, during which it has entered many new fields of usefulness as the "fuel of the future," indicates that, after a century of endeavour devoted to overcoming human prejudice and the competition of other heating and lighting agencies, its real possibilities are at last apparent to the public at large, to investors, and to the operators of gas properties.

A COMMON NECESSITY AMONG ALL CLASSES.

The early history of so-called "illuminating gas" in this country and in Europe is a story of progress temporarily impeded by the great cost of supplying service, and the consequent high selling price, by the advent of kerosene and later electricity in competition, and by the unreasoning opposition, amounting at the beginning almost to superstition, which so often has retarded the development of the world's greatest inventions. In the illuminating field alone, however, gas has met and surmounted all these obstructing influences, exhibiting a steady, if not astonishing, rate of growth, being better understood, and gaining a firmer hold on popular favour each year.

Such changes have taken place in methods of manufacture, and such economies of operation have been introduced of late years, as to permit regular and consistent reductions in selling price, with coincident increase in consumption, until the use of gas, especially for cooking and heating, is now universally conceded to be a necessity of modern domestic life among people of all classes.

A THOUSAND USES FOR GAS HAVE BEEN FOUND.

Lower prices have been accentuated by more thorough service, better quality of gas, and improved appliances giving greater efficiency at less cost to consumers, with the result that this clean, convenient, and economical commodity is now in general use by families with small incomes.

Scientific demonstration and practical experience have established beyond all question the hygienic, social, and economic benefits of modern gas lighting and heating, and assure their permanency. "One thousand uses for gas"—a common expression of the present day—proves that gas has not only arrived, but that it is never going back.

In the many new directions in which it has been applied as fuel during the past few years, and in the rapidity with which the volume of consumption has increased and the price per 1000 decreased, is to be found statistical support of the most optimistic predictions as to the future development of this great industry, and justification for the use of a time-honoured but expressive phrase in the statement that, notwithstanding it is a hundred years old, gas is still "in its infancy."

IT WAS SLOW-GOING IN THE EARLY DAYS.

In the United States census reports for 1900 is given a brief historical summary of the gas business in America, from which the following interesting facts are gathered.

The history of the gas industry in this country dates from 1806, at which time David Melville, of Newport, R.I., lighted his premises with coal gas manufactured in a crude apparatus. In 1813 he secured a patent, and later applied gas to the lighting of a cotton mill in Watertown, Mass. About this time gas was used in a mill at Providence, R.I., and in 1817 was employed as an illuminant in a lighthouse. As early as 1816, a company was chartered in Baltimore, Md., and was followed by the formation of a company in Boston, Mass., in 1821. Mobile was one of the earliest cities to have a gas plant; and New York City adopted this means of lighting in 1823. Soon afterwards companies were organized in Brooklyn, N.Y., and Bristol, R.I. It was not until 1835 that an ordinance was passed providing for the construction of a gas-works in Philadelphia.

THE GROWTH OF THE INDUSTRY SINCE 1850.

The slow growth of the industry during the first half of the Nineteenth Century—due most probably to the antipathy of a large part of the general public, the high prices charged, and the reluctance of investors to finance a business which required such great initial outlay—may be known from the fact that in 1850 there were only thirty gas-making establishments in the whole country. At that time the total value of the gas produced annually was less than two million dollars. The following figures show the growth of the industry from 1850 to 1910, and are particularly significant for the last ten years:

Year.	No. of Plants.	Capital Employed.	Annual Product.
1850	30	$6,674,000	$1,921,746
1890	742	258,772,000	56,987,000
1900	877	567,001,000	75,717,000
1905	1019	725,035,000	125,145,000
1910	1296	915,537,000	166,814,000

From 1900 to 1910, the increase in number of establishments was 419, or 47·8 per cent.; while in the preceding decade, 1890 to 1900, the increase was 135, or only 18·2 per cent. In 1910 the value of the annual product had increased $91,097,000, or $20·3 per cent. over that of 1900; while from 1890 to 1900, the increase was $18,730,000, or only 33 per cent. In amount of capital, the increase from 1900 to 1910 was $348,536,000, only slightly above the increase of the previous decade, $308,229,000.

Notwithstanding this conservative financing, the rate of increase in capital being much smaller than in volume of business, the gas industry has reached and securely holds its position of third in point of capital invested, with the possibility of eventually being second—yielding precedence to the iron and steel industry alone.

GAS COMPARED WITH OTHER MANUFACTURES.

In giving a true idea of the mammoth proportions to which the manufacture of illuminating and fuel gas has expanded, a comparison with a few others of the greatest specified industries, using the figures of the most recent statistical abstract of the United States, is both interesting and conclusive:

Specified Industry.	Capital.
Iron and steel works, &c.	$1,004,735,000
Foundry and machinery shop produce	1,514,332,000
Lumber and timber products	1,176,675,000
Gas (illuminating and heating)	915,537,000
Cotton goods	822,238,000
Woollen goods	430,579,000
Malt liquors	671,158,000
Printing and publishing	588,346,000
Leather	332,727,000
Meat packing, &c.	383,249,000
Tobacco manufactures	245,660,000
Men's clothing	275,320,000
Boots and shoes	222,324,000
Agricultural implements	256,281,000
Flour and mill products	349,152,000
Automobiles	173,837,000

It should be remembered that gas is here viewed as a manufactured commodity only, and not in comparison with other public utilities engaged in transportation, transmission of power, or providing means of personal communication—such as railroads, electricity, telephone, or telegraph. The capital of American railways is as great as that of all the manufacturing industries combined, in each case exceeding $18,000,000,000.

GROWTH DURING DECADE FROM 1900 TO 1910.

Undoubtedly, the most remarkable period of development in the manufacture of artificial gas is that of the ten years covered by the census reports of 1910, from which the following detailed information is extracted:

Year.	Number Engaged in Industry.	Wages and Salaries Paid.
1899	28,363	$17,709,000
1904	40,043	25,522,000
1909	51,007	33,316,000

Year.	Cost of Materials.	Value of Product.
1899	$20,605,000	$75,717,000
1904	37,180,000	125,145,000
1909	52,428,000	166,814,000

That gas companies, as consumers of other commodities and employers of labour, have not escaped the general increased "cost of living" since 1900 is here disclosed. Although the output underwent the enormous increase of $91,097,000, or 120·3 per cent. during this decade, the cost of materials used increased 154·4 per cent. The number of persons engaged in the industry increased 80 per cent.; while the amount paid in salaries and wages increased 88·1 per cent.

THE SIZE OF THE NATION'S GAS BILL.

The annual product of the artificial gas industry in the United States during 1909 ($166,814,000; the value of the gas itself being $138,615,309) may be termed a gas bill of "right smart" size. It is greater than the value of all the petroleum produced in this country during the same year ($128,328,487); greater than all the gold ($99,673,400), and all the silver ($28,455,200). It is over $100,000,000 greater than the value of all the natural gas ($63,206,941); and greater than the value of all the Pennsylvania anthracite coal mined in the same year ($149,181,587). It is practically two-fifths as great as the value of all the pig iron ($419,175,000), or all the coal, other than Pennsylvania anthracite ($405,486,777), taken from the earth during the twelve months.

However, it is interesting and instructive to note that while the nation pays the gas companies $166,814,000, the American manufacturers' bill for the tobacco we use annually is $416,695,000; for the malt and distilled liquors we drink, $579,429,000; for the confectionery we eat, $134,796,000; for the jewellery we wear, $80,350,000. So it will be observed that while investors and operators have been bringing the gas business up to its position of third among manufactured commodities, the people as a whole have been paying more than three times as much for their drinks, more than twice as much for their smokes, nearly as much for their candy, and half as much for their jewellery, as they have been paying for their gas.

PRICE OF GAS HAS GONE DOWN STEADILY.

These facts lead naturally to the subject of prices; and under this head are to be found some of the most noteworthy features of the development which has been going on so quietly and rapidly during recent years. Notwithstanding the vast increase in capital invested, the continued rise in the cost of manufacturing materials and wages, accompanied by more and more exacting requirements in improved service, we are confronted with the evidence of a constant and somewhat surprising decline in the prices at which gas is sold for domestic and industrial purposes.

Among all the great manufacturing industries listed in the census reports, artificial gas stands practically alone in exhibiting continuous and substantial reductions in price to the consumer during the entire period of the so-called "high cost of living." In this respect, therefore, being in use among all classes, it has had material effect in retarding the increase in the cost of living in general.

POPULAR DEMAND FOR GAS INCREASES.

This situation is the outgrowth of an increasing popular demand for this modern, labour-saving, sanitary, and inexpensive fuel and illumi-

nant, coupled with the ability, enterprise, and experience of operators who have persevered in seeking new fields of application for artificial gas, and in bringing about greater economy in methods of production.

From the beginning the price of gas has been going down. During the earlier years the cost of manufacture and distribution was so great that its use was limited to lighting exclusively. Thus the term "illuminating gas" became so firmly established, that it is only recently that its commercial name has been properly changed to "manufactured" or artificial gas.

In an address delivered at Philadelphia, at the celebration of the centenary of the use of gas as an illuminant, the Hon. George B. Cortelyou stated that in New York City the price of gas in 1826 was $10.00 per 1000 cubic feet; in 1846, $6.00; in 1866, $3.50; in 1886, $1.25; in 1900, $1.05. In 1901, it dropped to $1.00, and finally to 80 c., the present rate. These figures are a very fair epitome of the conditions that prevailed generally in other cities, with due allowance for differing local influences and degree of development.

The Arrival of "Dollar Gas."

The arrival of "dollar gas," which was, generally speaking, about the year 1900, was concurrent, it will be seen, with what may be well termed a "new era" in the industry, and since that date the price has continued to decline in inverse ratio to the growth of the business. In some large cities—as in New York and Chicago—where the *per capita* consumption is very large and cost of distribution relatively less, the "straight" or uniform rate has been reduced considerably below $1.00. In others, where smaller consumption and slower development have not permitted the reduction of the base rate to or below $1.00, progressive companies have found means of opening up new fields, and stimulating the industrial activities of their communities by the modern "sliding-scale" or quantity rates, by which the price on large quantities may be brought to a much lower figure.

A Potent Influence in Fuel Development.

The sliding-scale has been one of the most potent influences in the increase in the use of artificial gas as fuel, and its possibilities in this direction are too great to be estimated. The system of lower prices in proportion to the amount of gas used has been established as the correct one by investigation by State Commissions and other official bodies having to do with the regulation of public service companies. It has been recognized always as a sound business principle, applicable in every line of industry and trade. It does not make for higher prices to the small purchaser; the effect being, in reality, to lower the price to all classes by stimulating larger use in avenues of application hitherto closed to artificial gas.

In a recent investigation by the Wisconsin Commission, it was found that about 70 per cent. of the total number of persons using gas in Milwaukee (being the ones usually designated "small consumers") were paying less than their share of the cost of service, and using only one-third of the gas produced and sold. In this case the Commission ordered, as fair and just to all, a quantity rate schedule, by which the minimum price to large users is 40 per cent. lower than the maximum or base rate.

Total Production—Average Price.

In a business so vitally affected by geographical, topographical, and social conditions, it would be unfair and useless to attempt to compare the prices prevailing in different cities, even of the same size; but almost without exception the general trend of lower prices for gas has been felt in all cities of the country. Statistics show the totals and averages for the United States:—

Year.	Cubic Feet Sold.	Amount Sales.	Average Price per 1000.
1900 ..	67,093,553,000 ..	$69,432,582 ..	$1.035
1905 ..	117,866,000,000 ..	111,009,956 ..	.94
1908 ..	156,909,310,000 ..	133,571,122 ..	.85
1912 ..	212,391,168,000 ..	148,282,725 ..	.70

These figures include all the gas sold for fuel and lighting by the companies reporting. They embrace also the gas produced in retort-ovens and sold to iron and steel works and other industrial establishments at a price far below any yet possible for domestic consumption. The growing popularity of gas fuel under conditions of enormous demand for manufacturing purposes has given great impetus to retort-oven production. The quantity of such product being sold and utilized must necessarily be included in any review of artificial gas as a manufacturing industry; and, in fact, this is one of the most striking and significant features of the industry to-day.

In 1900 the use of artificial gas for fuel was just beginning to be appreciated, and to the rapid growth along this line, to the sliding-scales of rates on large quantities, and the introduction of more efficient gas-burning appliances, is to be ascribed in most part the astonishing decline of 32 per cent. in the average price of gas during a period in which the average price of all raw and manufactured commodities of the country was increasing 33·6 per cent.

Fuel and Lighting Consumption Compared.

From the reports of the United States Geological Survey (Parker), which began the collection of oil and water gas statistics in 1905, supplementary to coal gas statistics, the rapidity with which artificial gas has come into wider use as fuel is ascertained:—

Year.	Cubic Feet Used, Fuel.	Value.	Average Price.	Per Cent. Total.
1905 . . .	31,516,000,000 ..	$27,983,513 ..	88·8 c. ..	27
1908 . . .	47,619,193,000 ..	39,677,034 ..	83·3 c. ..	30
1912 . . .	112,390,847,000 ..	67,751,473 ..	60·0 c. ..	53

Year.	Cubic Feet Used, Light.	Value.	Average Price.	Per Cent. Total.
1905 . . .	86,350,000,000 ..	$83,026,443 ..	96·1 c. ..	73
1908 . . .	109,290,117,000 ..	93,894,088 ..	86·0 c. ..	70
1912 . . .	100,000,321,000 ..	80,531,252 ..	80·0 c. ..	47

The decrease in the quantity of gas sold for illumination since 1908 may be charged to the more general use of the incandescent mantle, which lessens the amount of gas required for any degree of light.

It should be borne in mind also that in the present-day domestic use of gas it is impossible to estimate with exactness the different quantities consumed in lighting and as fuel. The substitution of quantity rates for the former lighting and fuel rates in many cities, naturally results in passing the gas used for both purposes through the same meter in an increasing number of cases.

Has Kept Pace in Competition.

In the earlier days of the gas lighting business, the advent of kerosene and improved oil lamps was of threatening import, because of the relatively low candle power and high price of the gas then manufactured. This situation led to the invention of the Lowe process of water gas manufacture, giving a product superior to kerosene in efficiency. Starting in the seventies, the manufacture of water gas immediately grew in favour, and eventually the largest part of the artificial gas sold was of this character, estimated at one time to be as great as 75 per cent. of the total.

The introduction of electricity for illumination, which was at first believed to be the death-knell of gas lighting, has not checked the development of the gas industry in general. In fact, it may be accepted that much of the growth in the artificial gas business has been due to the stimulating effect of electric competition.

The Gas-Mantle has been an Important Aid.

The incandescent mantle, though giving much better results in illumination, with smaller consumption of gas, has been nevertheless an important factor in the development of recent years, enabling the gas-lamp to maintain its position of superiority in point both of high efficiency and low cost. It has had the effect also of eliminating the necessity of high candle power in gas—an important and expensive requirement when open flame tips were in general use. The incandescence of the mantle light being produced by the heat energy of the gas, without regard to the candle power, has served to repopularize coal gas for all purposes. The relative gains in this branch of the industry since 1905 are shown in the following tables:—

Year.	Cubic Feet, Coal Gas.	Value.	Average Price.	Per Cent. Total.
1905 . . .	40,454,000,000 ..	$32,937,456 ..	81·4 c. ..	34·3
1908 . . .	53,561,813,000 ..	37,227 901 ..	70·0 c. ..	34·1
1912 . . .	89,693,372,000 ..	36,681,884 ..	41·0 c. ..	42·2

Year.	Water and Oil Gas.	Value.	Average Price.	Per Cent. Total.
1905 . . .	77,412,000,000 ..	$78,072,500 ..	$1.008 ..	65·7
1908 . . .	103,347,397,000 ..	96,343,221 ..	.93 ..	65·9
1912 . . .	122,697,796,000 ..	111,600,841 ..	.91 ..	57·8

Comparison of the years 1912 and 1908 is briefly summarized in the last report of the Geological Survey on this subject as follows:

> The total quantity of artificial gas produced in the United States in 1912, reported by 1062 establishments, was 228,076,510,000 cubic feet. Of this production, about 7 per cent. (15,685,342,000) was lost or unaccounted for, so that the quantity sold or utilized amounted to 212,391,168,000 cubic feet. This was valued at $148,282,725, or about 70 cents per thousand cubic feet. In 1908, the latest previous year for which the statistics were collected, the net production—that is, the total production less the gas un-accounted for—was 156,909,310,000 cubic feet, valued at $133,571,122, or about 85 cents per thousand cubic feet. There was a general decrease in prices in 1912 compared with 1908, except in the value of oil and water gas, but the chief cause of the apparent decline of nearly 20 per cent. in the mean average price was the largely increased production at retort coke-ovens of gas that was extensively used at manufacturing plants connected with the coke works and charged to the consuming establishments at merely nominal prices, much of it at less than 10 cents per thousand cubic feet. The average price of oil and water gas sold for illumination in 1912 was a fraction of a cent higher than 1908, the figures being, respectively, 92·4 cents and 92 cents per thousand cubic feet. The average price of this gas sold for fuel shows a decline from 98 cents per thousand cubic feet in 1908 to 89 cents in 1912. The average price for coal gas, which includes the surplus gas from retort ovens, was 70 cents per thousand cubic feet in 1908 and 41 cents in 1912. The decline in the average price of this gas used as fuel was nearly 50 per cent. from 65 cents per thousand cubic feet in 1908 to 33 cents. in 1912. The average price of illuminating (coal) gas declined from 73 cents to 55 cents. It should be noted that the quantity of illuminating gas used in 1912 was less than in 1908, coal gas falling off about 620,000,000 cubic feet, and oil and water gas more than 8,600,000,000 cubic feet. . . . On the other hand, the use of gas as fuel shows a marked increase—from 47,619,193,000 cubic feet in 1908 to 112,390,847,000 cubic feet in 1912. This increase, for reasons already stated, was chiefly in coal gas—from a little over 21,000,000,000 cubic feet in 1908 to nearly 58,000,000,000 cubic feet in 1912—though the use of oil and water gas as fuel also shows an increase of more than 100 per cent.—from 26,500,000,000 cubic feet in 1908 to 54,500,000,000 cubic feet in 1912.

While Gas Goes Down Other Commodities Go Up.

These reports, showing in detail the increasing use and the steady decline in the average price of artificial gas the country over, are especially striking in comparison with reports of the United States Department of Labour on the rapid and sustained rise in prices of practically all the commodities of everyday life. Taking the average wholesale price from 1890 to 1900 as a base, or 100 per cent., the Department of Labour finds the following increases in the dozen years since 1900, while gas has been going down 32 per cent.:—

Commodity.	Increase 1900 to 1912. Per Cent.
Fuel and light (coal, oil, &c.)	33·9
Lumber and building materials	48·2
Cloths and clothing	20·7
Food and food products	39·5
Farm products	71·3
Total raw commodities	49·5
Total manufactured commodities	29·7
Total all commodities	33·6

In retail prices, the advance during the period named has been even more marked, the increase on fifteen principal articles of food having been 57·9 per cent.

Gas Gains Faster than Population.

Comparison of growth in the manufacture of gas with the growth of population in cities shows that the use of gas is increasing more than three times as fast as population. From 1900 to 1910, the increase in the urban population of the United States was 34·8 per cent. During the same period the increase in the value of illuminating and heating gas produced was 120·3 per cent. This signifies an increasing rate of consumption *per capita*, and consequent decreasing cost per 1000 cubic feet, especially in distribution.

In the four great boroughs of New York City the population grew 90·6 per cent. from 1890 to 1910, while in the seventeen years from 1893 to 1910 the gas sales increased 164·6 per cent., and the consumption *per capita* reached 8350 cubic feet. In cities of over 100,000 and less than 600,000 population, the average annual sales, as reported in Brown's Directory, are 5190 cubic feet *per capita*. Each succeeding year shows gains in sales *per capita*, and also in number of meters and amount consumed per meter.

All the foregoing facts supply convincing proof of the growing favour with which gas is regarded by the general public, and that this staple and cheap commodity has become unquestionably one of the necessities of modern life in America.

Characteristics of Gas Securities.

The safety, stability, and all-round desirability of gas bonds from the investor's point of view are fully recognized by financial authorities. Their record in these respects is not excelled by any other class of securities, even among public utilities, which are conceded to be in general the safest and most desirable of all. Mr. Lawrence MacIntyre, writing on this subject, is authority for the statement:

> Gas bonds merit the very highest degree of confidence. . . . While it has been impossible to get the exact figures, there is in the neighbourhood of $400,000,000 invested in the mortgage debts (or their equivalent) of gas companies in the United States; and of this enormous amount there is probably less than 1 per cent. of the interest in default—a record not equalled by any form of investment other than United States Government bonds.

The causes and conditions which have contributed to the desirability of gas bonds are numerous. They are of such a character as assures continuance of the satisfaction which investors have always found in securities of this nature. The future of the gas business as a commercial giant among the greatest manufacturing industries of the country, is foretold with certainty in the statistics of its past growth and present proportions.

Large Physical Valuation.

Tangible property, of course, is the basic security for mortgage indebtedness. Bonds are simple formal instruments representing such loans in fractional parts. The physical value of gas properties, compared with the volume of business and operating expenses of most other great industries, is relatively very large. One-half the total investment is in underground construction. Every part of a gas plant is of stable and permanent character, and depreciation of works and distribution system is relatively very low. Thus no more favourable basis could be afforded for the investment of the funds of estates, institutions, trustees, or individuals. Opportunity for such investment is a fundamental requirement in the prosperity and progress of society at large.

Gas has Great Net Earning Power.

Next in importance to physical value as security for mortgage or bonded debt is net earning power, as distinguished from volume of business. Interest upon bonds must be earned, and in this respect, as has been stated, the record of gas bonds stands unequalled, except by United States government securities. With a product valued at $166,814,000 during the year 1909, on capital employed of $915,537,000, it will be noted that the artificial gas business is turning over its capital only once in 5½ years, while in many other lines of industry it is expected to turn over the capital two or three times each year. An idea of the net earning power of gas, however, is obtained from the fact that during 1909 the total expense for manufacturing materials ($52,428,000) and salaries and wages ($33,316,000) was $85,744,000. Adding to this taxes of $7,836,000 (about 4·6 per cent. of the gross value of the product), the total operating cost is $93,580,000, leaving the sum of $73,234,000 to be applied to the payment of bond interest, miscellaneous expenses, depreciation, and dividends.

Not Affected by Financial Flurries.

It is apparent that in fixedness or permanence of net earning power, those corporations are best which supply to the public at large a commodity looked upon as a necessity—one of which each individual uses a comparatively small quantity, and yet one which practically every individual needs. Under such circumstances, the proportion of the individual's income expended is very small, while the total consumption of the commodity is very large. This explains why public utility bonds in general are more attractive than others to careful investors. It is for the same reason that periods of financial depression—even panics—have not had, and cannot have, any injurious effect upon the sales of artificial gas or upon the real value of gas securities.

Gas companies are even more certain perhaps than other public utilities to retain their character as monopolies. The good of the public service will ever require it. The extraordinary first cost of preparing to supply a city with gas, with one-half the construction underlying the streets and thoroughfares, prohibits the duplication of investment, whether by municipal or by private capital. Competing gas companies could not exist in any city without adding to the cost of service to the public, in either interest or taxes, and the users of gas would be required sooner or later to carry the burden of duplicated investment. On this subject, the Wisconsin Commission says:

> Duplication of such plants is a waste of capital, whenever the service can be adequately furnished by one plant only. It necessarily means that interest and maintenance must be earned on a much greater (if not twice as great an) investment, and that the actual cost of operation is likely to be relatively higher. . . . In fact, active and continuous competition between public utility corporations furnishing the same service to the same locality seems to be out of the question. This has been shown by experience.

The elements of necessity and monopoly can never be disassociated from the artificial gas industry; and while they justify and invite regulation by the State for the protection of the public, they also assure, through such regulation, protection of the investment. Legislative action, as demonstrated by the labours and the experience of public utilities commissions in various States, has shown the popular trend in this direction, and it will not be long before such commissions are established in practically every State in the Union.

State Regulation Increases Safety.

Under all such legislation lies the principle that the State, having once assumed authority over public service properties, will never allow whole or partial confiscation of invested capital, or permit such careless, inefficient, or dishonest operation as would imperil the interest or principal of the bonded debt. By exercising its power to regulate rates and prescribe adequate service, the State interposes the bulwark of justice to protect investors against confiscatory or unreasonable rates or requirements.

One result of the universal regulatory tendency has been to lessen the importance attaching to terms and provisions of franchises. While public utility companies are now generally debarred from exacting exorbitant or unreasonable profits, or neglecting the requirements of adequate service, though their franchise grants might permit of both, municipalities, on the other hand, may not take unfair advantage of established and properly managed concerns upon the expiration of franchise contracts.

Formerly, the duration of a franchise, rates named, and requirements specified were of the most vital importance in fixing the status of mortgage bonds, but at present they are of much less significance, though not without direct influence on the value of securities.

Co-operation is Replacing Hostility.

A general view of the artificial gas industry shows that capital has always profited in fair measure by investment in this class of stocks and securities, but seldom to an exorbitant or unreasonable extent. The ability, enterprise, and conservatism commingled in the development of the gas business are proved by its great expansion on steadily falling prices. Its strength and soundness are evidenced by the fact that in every section of the country gas companies have undergone the most searching scrutiny as to methods of financing and operation, and, with scarcely an exception, have justified the confidence of their bondholders and the people served.

Marked changes are taking place in the public mind in its attitude toward public utilities, and particularly toward gas companies. In every city gas is now recognized as one of the most important and most necessary commodities demanded by modern standards of living. Genius and perseverance have beaten down prejudice a century old; progressive and efficient management has dissipated whatever suspicion may have once existed. Exploitation of the public for excessive profit has ceased. Political exploitation of public utilities is no longer effective. Co-operation is fast becoming the rule; hostility the exception.

Eight Years in Detail.

—	1905.	1508.	1912.
Number of plants reporting	1,006	1,058	1,062
Coal gas (Fuel) . cub. ft.	13,636,000,000	21,076,242,000	57,829,320,000
,, (Illum.) . ,,	26,818,000,000	32,485,571,000	31,864,052,000
Total	40,454,000,000	53,561,813,000	89,693,372,000
Value of coal gas (Fuel) .	$9,799,095	$13,627,971	$19,082,228
,, ,, (Illum.) .	23,138,361	23,599,930	17,599,656
Total	$32,937,456	$37,227,901	$36,681,884
Water gas (Fuel) . cub. ft.	17,880,000,000	26,542,951,000	54,561,527,000
,, ,, (Illum.) ,,	59,532,000,000	76,804,546,000	68,136,269,000
Total	77,412,000,000	103,347,497,000	122,697,796,000
Value of water gas (Fuel) .	$18,184,418	$26,049,063	$48,669,245
,, ,, (Illum.)	59,888,082	70,294,158	62,931,596
Total	$78,072,500	$96,343,221	$111,600,841
Total cubic feet sold . .	117,866,000,000	156,909,310,000	212,391,168,000
Total value	$111,009,956	$133,571,122	$148,282,725
Aver. price per 1000 cub. ft.	94 c.	85 c.	70 c.

Appropriation of Trading Profits at Darwen.—The Darwen Corporation last Thursday decided on rates amounting to 7s. 6d. in the pound—the same as last year. A sum of £2000 was taken from the Gas Department, £1000 from the Water Department, and £500 from the Electricity Department for the relief of the rates; and this enabled the Corporation to avoid an increase.

Prepayment Meter Frauds in Manchester.—Robberies from prepayment meters in the working-class districts of Manchester are again prevalent, as also is the substitution of metal discs in lieu of coins. The frauds are not, however, confined to the industrial section of the community, for in the course of a recent inspection it was discovered that a consumer had filed down several halfpennies to obtain gas from a shilling-in-the-slot meter. At the City Police Court on Friday, a youth of seventeen, named James Henry Rushton, of no fixed abode, was charged with breaking open a penny-in-the-slot meter, and abstracting 7s. 5d. He pleaded guilty, and was sent for trial at the Sessions; previous convictions for similar offences having been recorded against him.

BOMBAY GAS COMPANY, LIMITED.

The Gas Business under Indian Conditions.

The Annual General Meeting of the Company was held last Thursday, at the London offices, Moorgate Station Chambers, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. A. Dickson, jun.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN moved the adoption of the report and the statement of accounts, together with the declaration of a dividend of 4½ per cent. (less income-tax), making, with the interim payment of 3 per cent., 7½ per cent. for the year. In doing this, he said his task was an easy one. It would be seen from the report that there had been an increase in the sale of gas; and he might inform the shareholders that 6·1 per cent. was a very satisfactory advance, and agreed with the best of English experience. The accounts enabled the Directors, with the balance brought forward—after allowing for the interim dividend paid last November, of £8400, to place £760 to the reserve fund, to recommend the dividend which he had moved, and to carry forward £8101 to the accounts for the current year. Turning to the accounts, it would be seen that the capital had gone up by £9078. It was an axiom with the Directors that the capital must not rise so fast as the business grew. The business in the past year grew by 6 per cent.; and as the additional expenditure of capital was only 3 per cent., he thought the shareholders would agree that the Directors were following the proper principle of carefully subordinating the capital to the amount of business done. The capital of £302,000 stood at £1289 per million cubic feet, which was about 20s. 9d. per 1000 cubic feet. If this were an English Company, he should quarrel with the figure, and say it should be about half. The high rate of capital expenditure was everywhere the case abroad—even if they only took France, much less India. But the difference in their own case was being decreased by the policy of the Board in regard to extensions and improvements; and this would be seen when he told the shareholders that only a few years ago the capital stood at over £2000 per million cubic feet of gas sold. From this they would agree that the Company were on the right path. One reason why the capital was large in Bombay compared with the quantity of gas sold was that they had upwards of 130 miles of mains there, and the sale of gas, which amounted to 234 million cubic feet, equalled only 1,800,000 cubic feet per mile of main; while in this country it was 5 to 6 millions in country towns, and 10 millions in London proper. From this the shareholders would see that Bombay was not the most profitable zone in which to operate a gas supply undertaking. Turning to the revenue account, the most important figure for the shareholders was the profit out of which they received their dividend. This stood at £24,450 in round figures, as against an amount £2669 less last year. Inasmuch as the shareholders knew that English companies had been suffering from the extra price of coal, they would wonder how the Company had obtained the extra profit. Up to now they had escaped the rise in the price of coal, as they had been buying coals from another source. But there, however, some trouble was now being experienced; and the Directors had been obliged to purchase a quantity of English coal. They hoped, however, that things would return to their normal course at the source of their coal supply, so that they might again buy the excellent coal at a lower price delivered from Australia instead of from Newcastle. As he had said before, the Directors would not be satisfied with a profit of the sort mentioned, if it were not arrived at after allowing for the fullest upkeep and maintenance of the whole undertaking. He dwelt upon this because some gentleman in the "Investors' Guardian" seemed to think the Company ought to put money away to depreciation. But when he (the Chairman) said that the expenditure on the works equalled no less than 6½d. per 1000 cubic feet, and that on the district amounted to nearly 10½d., it would be seen that there was a liberal allowance for upkeep, even after making further allowance for extra cost inherent to doing work in Bombay as compared with England. There was under distribution a figure for fittings, £3659, on the expenditure side of the account. As a rule, they had put the balance on the other side of the account. The reason they had turned the balance to the expenditure side was that some time ago they gave the officials instructions not to pursue a profit on the fittings, but to look to profit being made by extending the use of gas. But the figure in the present accounts exceeded what the Directors thought was right and reasonable; and it was having their earnest attention, to see whether it could not be reduced. It was an unusual figure to see on the expenditure side. It amounted to 3½d. per 1000 cubic feet of gas sold; and it must be seen whether this was an absolutely necessary figure to spend in the development of the business, or whether it might not have arisen from some error in the accounts. Another figure he had marked for reference was the Directors' allowance, £1100. He had always thought this was a poor reward for the excellent assistance that the shareholders received from the Board in the management of the business; for this was a Board of experts, and "expert" directors had been a subject that had been much in the air lately. If some of the shareholders would study this question, and give notice before next year to have this little irregularity made good, they would not receive any opposition from the Directors' side of the table. [Laughter.] With regard to the income, the private gas-rental worked out to 6s. 2d. per 1000 cubic feet. This, again, was some 50 per cent. greater under the circumstances of the foreign position. There was a comparatively small amount of business done over this extensive city, 10 miles from north to south, and nearly 3 miles from east to west. The income from public lighting (£22,130) looked about half the amount of the private gas-rental; but as the gas was sold for public lighting at a lower price, the quantity was roughly about 38 per cent. of the whole output, and that for the private lighting about 62 per cent., which was not a very bad position for a company of this sort. Foreign companies often depended more upon the public lighting revenue than upon the private. In consideration of the 6 per cent. increase in sale, there was an increased receipt of £3606 for gas; and there was a small increase of about £100 in rental for meters and fittings. The increase in the receipts from products—nearly altogether from coke—was £1765; and this made a total of £5467 increase in income. Reverting to the question of repairs and maintenance of the works, if they compared the figure in the present accounts with that for the preceding year, it would be seen that it was about £4000 less. The reason was that in 1912 they had to put up a gasholder in place of one that had become old and decayed. He might say that great developments were going on in Bombay. A part of the bay was being enclosed, and large extensions of the dock accommodation were now going on; and the Directors saw no reason to doubt that the gas business would continue to grow, and even at a more rapid rate than in the past. Bombay would, however, never be an extremely remunerative district, because of the great extent of their mains—the population living in a sparsely scattered way, and the people comparatively small consumers. It would be noticed that for prepayment meters the Company only received £64 as rental. The Deputy-Chairman (Mr. W. G. Bradshaw) sat at the head of a Company that had 90,000 working men slot consumers, as compared with about 18,000 ordinary consumers. He himself sat at the head of a Company where they had 75,000 slot consumers, against 22,000 ordinary ones. But the shareholders would see at once that in a place like Bombay where the income of the working man was so small, it would be exceedingly dangerous to go to any great expense in fitting up installations to give him the use of gas for which he could not possibly pay. A discriminating Board had to watch these things, and to act accordingly. The Board did not renounce the slot meter. They hoped to extend it where it could be profitably extended. He was sorry that their Engineer and Manager (Mr. A. R. Burch), who was on his way home, had not arrived in time to be present at the meeting. He had rendered the Company inestimable service; and, in fact, the work done in Bombay reflected the highest credit on the whole of the staff there.

The DEPUTY-CHAIRMAN (Mr. W. G. Bradshaw) seconded the motion.

Mr. EDWARD CLARK said there was one matter to which the Chairman had not referred, and that was that the Company owed their bankers £16,000. He inquired if this was a temporary or permanent advance. The Chairman had given them information as to the extension of the business; and, of course, they could not have these developments without spending more money. If the £16,000 was not a permanent debt, possibly the Board had paid off a large proportion of it since the end of the half year. But he would point out that in the history and traditions of this Company, they had never gone into debt. They had never had any preference or debenture stock. Debenture stock was a debt of which he personally had the greatest horror. He would submit to the judgment of the Board whether it would not be desirable to issue the £20,000 of unissued shares, so as to have a clean sheet, and not be in debt to the bankers, or to anybody else. One other matter. Years ago, possibly before the association of the Chairman with the Company, a crisis arose owing to the fact that the stores in Bombay had proved to be much less than they appeared to be on paper. He did not think it desirable to see materially increased, but he would rather see reduced, the sum on fittings. It had been going up substantially the last three or four years—sundry stores, £17,000, £19,000, £20,000, and now nearly £21,000. Of course, they all knew that the stocks of coal and other things must vary, and provision must be made for this. But he would urge the Board to keep a very careful look-out upon the accumulation of stocks, and especially upon the portion that depreciated. He also suggested that 7½ per cent. dividend was not one that was looked upon with great satisfaction by gas shareholders. He thought they ought to have 8 per cent. before considering an increase in the Directors' remuneration.

Mr. A. W. OKE, while sympathizing with the desire for a higher dividend, said the shareholders must consider the peculiar position of the Bombay Gas Company. When he visited the works two years ago, he was exceedingly pleased with the way that the Company was managed there, and with the splendid works and show-rooms they possessed. He would remind the shareholders that a very large sum of money had been spent on the works; and no one could fail to be satisfied with the results produced by them. He did not agree with the suggestions of the last speaker as to the financing of the Company. Providing the Directors were able to obtain advances from the bank from time to time at low rates of interest, it was a very sound course to take. He also thought the last speaker hardly carried out the principles of company management in objecting to debenture stock or bonds. Instead of carrying out his suggestion as to raising further capital, if money were required it should be obtained by the issue of debentures or debenture bonds. He agreed that the Board were underpaid for the services they had rendered for so many years.

The CHAIRMAN said he was much in sympathy with Mr. Clark's observations as to the stocks in Bombay. The £20,000 was a large figure. But it was part of his duty as Chairman to look after the indents for goods going abroad; and he found that the requests sent home month after month showed a considerable demand for the class of goods using gas for heating purposes, which was on the increase more than formerly. The Board had looked into this matter, and it was one of the questions they would discuss with Mr. Burch while he was at home, as to whether it was possible to draw more readily from England (of course, freights took a long time to get out there), and whether they could rely more on buying at home and less upon stock in Bombay. With regard to capital, the loan from the bankers now only amounted to £4000 or £5000; but when they had paid their dividend in a few weeks' time, it would be up again. The Board were quite willing to consider the question of raising more capital; but they were getting rather near their limit in this respect. At the same time, there was nothing more convenient, when the Bank rate was low, than to borrow from a bank like their own—the City and Midland Bank. They got their money at a low rate of interest, instead of having to pay 7½ per cent. as they would have to do if more shares were issued. The Board wanted to pay a good dividend, but they also wanted to lower the price of gas in Bombay. They had dropped it considerably; but it was their earnest hope that the coal merchant (who had had his picking from gas companies) would now assist them in reducing the price of gas, and so extend the base from which the dividend was derived.

The motion was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. CLARK, the retiring

Directors (Field-Marshal Sir Evelyn Wood, V.C., G.C.B.) and Mr. W. G. Bradshaw were re-elected.

Proposed by Mr. F. R. SMITH, and seconded by Mr. W. RICHARDS, the Auditors (Mr. Spencer Gore-Browne and Mr. Ernest W. Drew, were re-appointed.

The Chairman moved a vote of thanks to the Engineer and Manager and the staff and workmen in India, as well as to the Secretary and staff in London. In their Secretary they had a most painstaking and capable officer. Their Engineer was recently raised to the rank of Member of the Institution of Civil Engineers. The Board were looking forward with the greatest satisfaction to discussing with him the affairs of the Company. Conspicuous among the other Bombay officers were Mr. Burch's assistant (Mr. Lane), and Mr. Woodford, the chief accountant. The whole staff, in fact, served the Company well; and the myriad of natives employed were quiet, submissive, patient, industrious men. The Company had to employ them in large numbers to do in India the work that a few Englishmen would do. He added that the works had now nearly double the power that they possessed some five years ago.

Mr. A. W. OKE seconded the motion, which was heartily agreed to.

The SECRETARY, on behalf of the staff generally, thanked the Chairman for his appreciative remarks, and the shareholders for their endorsement. The year, he observed, had not been a particularly eventful one, but it had been one of steady progress, with which they were all very much satisfied. He should have pleasure in transmitting the vote to the staff in India. The increase of business obtained during the first three months of this year had given satisfaction; and he believed the Chairman at the next meeting would be able to put before the shareholders results equally good with those of this occasion.

On the proposition of Mr. GORE-BROWNE, a resolution expressing appreciation of the services of the Chairman and the Board was cordially agreed to.

Lurgan Electric Lighting Scheme.—At a meeting of the Lurgan Urban Council on Monday of last week, members repudiated the insinuation made at the recent Board of Trade inquiry into the Council's application for a Provisional Order for electric lighting, that the Chairman (Mr. J. Mahaffy, J.P.) had been placed in office as a result of his promising to support the scheme, and denied that there was any truth in an allegation made at the inquiry that witnesses had been "got at." The Chairman said the insinuation regarding himself was most insulting. It had been said at the inquiry that the Council wished to deprive the Gas Company of their means of livelihood. While they would hesitate to do this, they were determined to oppose the Company getting any further powers to monopolize the lighting of Lurgan. After what had happened, it would be for the Council to consider the wisdom of breaking off negotiations with the Company for the purchase of their works, unless they withdrew further opposition to the granting of the Order. One result would be, in any case, that they would fight the Company's Bill to the bitter end.

MANCHESTER GAS AND ELECTRICITY UNDERTAKINGS.

The Profits in the Past Financial Year.

The statements submitted to the Gas Committee of the Manchester Corporation at a special meeting held last Wednesday—Councillor William Kay, J.P., in the chair—to consider the estimates for the ensuing financial year show that the actual gross profits for the twelve months ended the 31st of March last amounted to £116,023, compared with the estimate of £118,508. This figure has been arrived at after making full provision (on a depreciation basis) for renewals of plant to the extent of £62,000 for the year. The profits have been appropriated as follows: For interest, £38,638; statutory sinking fund for liquidation of debt, £63,722; and the balance of £13,663, together with £45,097 transferred from the reserve fund, has been applied to meet the contribution of £52,090 to the city fund in aid of the rates and certain capital expenditure, amounting to £6670, not chargeable against borrowing powers.

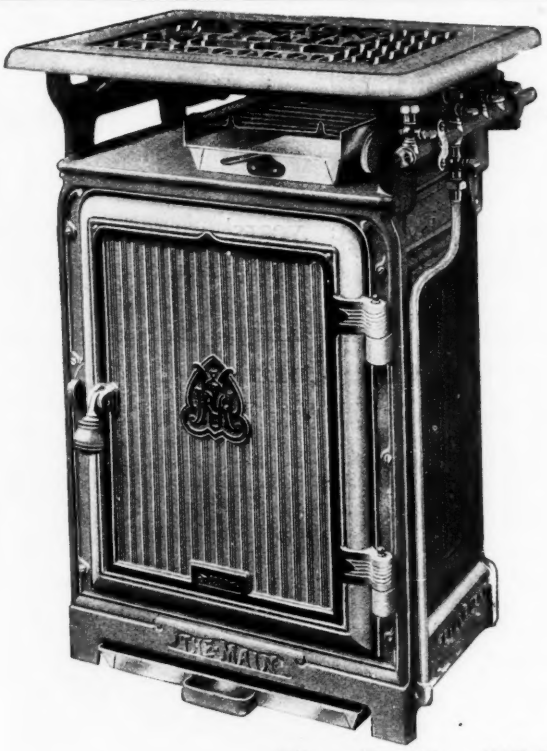
The foregoing results have been realized notwithstanding the large concessions, amounting to £65,000 per annum, made in respect of the price of gas last year. Sales of gas show an increase of 3 per cent. in the quantity sold over the previous year. This is satisfactory in view of the abnormally mild and clear weather experienced throughout the winter months. There has, however, been a marked falling-off in the receipts from coke; while the cost of coal has been considerably higher.

The number of consumers is now 187,870, of whom 70,420 are supplied through prepayment meters. The number of cookers, grillers, and fires fixed by the Gas Department is 119,790—an increase of 14,097 on the previous year.

For the ensuing financial year it is proposed to pay £50,000 to the city fund in aid of the rates, in accordance with the resolution of the City Council. The total sum contributed by the department in aid of the rates since the incorporation of the gas-works in 1843 now amounts to £3,167,175.

When the accounts for the past financial year are completed, the average price of gas in Manchester will work out at about 1s. 11½d. per 1000 cubic feet, compared with 2s. 2·31d. in the preceding year.

The Electricity Committee's report states that, as compared with the estimate prepared in April, the results of the year show an increased income of £17,212, and an increase of £7260 over the estimated net surplus. Judged by the actual results in the previous year, the income is higher by £36,125; and the net surplus rose from £28,331 to £36,760. Sales have risen from 104 million to 117 million B.T.U.—an improvement of 13½ per cent. For the forthcoming year, the Committee estimate that the income will be £552,800—an increase of £39,188 over the present figures; but the Committee do not expect the surplus to



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increase proportionately until such time as new capital outlays are fully productive, and coal prices are easier. The estimated surplus is, therefore, put at £30,500, of which £30,000 is earmarked for rate-aid in accordance with the recent decision of the Council; leaving a small balance towards the cost of such capital extensions as the Committee carry out from time to time without recourse to borrowing.

ROCHDALE MUNICIPAL UNDERTAKINGS.

Reference was made in the last number of the "JOURNAL" (p. 198) to the undertakings of the Rochdale Corporation, and to the fact that on the year's working of the Gas Department depended the question of whether or not the local rates should be raised.

The Gas Committee met last Thursday; and the results then presented show that the past year has been about the most unsatisfactory the Committee have experienced during the last two decades. As a result, the ratepayers are faced with the prospect of a substantial increase in the rates over their present figure of 8s. in the pound.

It was stated during the proceedings that the net profit amounted to £9800, as compared with the record profit of £23,654 twelve months ago—a decrease of £13,854. This is partly accounted for by an increase of more than £5000 in the cost of coal, and a decrease of nearly £5000 in the receipts from the sale of coke, of which the Committee have a very large stock on hand.

As pointed out in these columns last week, there has been a loss by the Electricity Department of £330 on the year's working; and the Committee decided not to make any grant in relief of rates. On Thursday last, however, they determined to take £3000 from the reserve fund in aid of the rates.

Apart from the Tramways Committee, the trading departments of the Corporation have had a bad year, and the total amount granted in relief of rates is only £13,489, or £6838 less than last year. There is fully £11,000 more to be rated for this year than was the case twelve months ago. This is equal to an extra rate of over 7d. in the pound.

The Finance Committee sat for three hours on Thursday to consider the estimates, and eventually decided to convene a special meeting of the Town Council in committee, It is probable that at this meeting some of the estimates of the Committees will be pruned, so as to avoid the necessity for such a large increase in the rates.

The total income of the Rochdale Gas Department for the past year was £97,321, against £103,449—a decrease of £6128. Working expenses amounted to £75,617, as compared with £68,419, which was an increase of £7196. This leaves a gross surplus of £21,704 (against £35,029) from which interest and sinking fund, amounting to £11,903 have to be met. When these capital charges have been allowed for, the net profit comes out at £9800, against £23,654 twelve months ago. The chief items of increased expenditure were on carbonization. The coal bill for the year just ended was £42,157, against £36,939. Stokers' wages also went up by £493. On the other hand, the income from residual products has shown a heavy fall, mainly on the sales of coke, which realized £16,347 a year ago, while in the twelve months just closed only £11,719 was received. In the previous year, the coal strike resulted in a largely increased sale of coke at higher prices than have ruled during the past year, when a much smaller quantity was disposed of.

The income from gas sold was £60,876, or £880 less. During the year £7705 was spent from the reserve fund, which was reduced thereby to £1624. The purchase and equipment of the gas fire, cooker, and fittings' show-room cost £4612, and £3091 was spent on renewals at the works. Capital expenditure on the works has now totalled £259,343; and there is £69,348 in the sinking fund. The first proposal made to the Committee on Thursday evening was to give £5454 to the rates; but an amendment to grant £7078 was ultimately carried.

LEICESTER CORPORATION GAS DEPARTMENT.

Analysis of the Annual Accounts.

The Gas Engineer and Manager of the Leicester Corporation (Mr. Hubert Pooley, Assoc.M.Inst.C.E.) has issued his analysis of the accounts of the Gas Department for the past financial year. The sale of gas produced £253,744; and the coal and working expenses, less residuals, came to £154,880—showing a profit on gas of £98,864. Adding miscellaneous receipts amounting to £3254, the last-named sum was brought up to £102,118; being at the rate of 10s. 9·48d. per ton of coal carbonized and 11·26d. per 1000 cubic feet of gas sold. From the gross profit (including the balance brought forward) of £146,593, a sum of £8907 was placed to the new meters account. The net profit was £72,952, or 7s. 8·5d. per ton of coal carbonized and 8·04d. per 1000 cubic feet of gas sold. From the net profit had to be deducted £37,474 in aid of the district rate, and £7000 placed to the reserve fund; making together £44,474, and leaving a balance of £28,478—being 3s. 0·11d. per ton of coal carbonized and 3·14d. per 1000 cubic feet of gas sold. The capital outstanding at the close of the year was £1,021,316; being £5 7s. 11d. per ton of coal carbonized and 9s. 4¾d. per 1000 cubic feet of gas sold.

The following are some of the particulars of working: Coal carbonized, 185,418 tons; oil used (coal equivalent), 3858 tons (together, 189,276 tons); and gas made, 2,286,110,000 cubic feet, of which 2,176,386,673 cubic feet were sold—equal to 95·07 per cent. of the output. The make per ton was 12,078 cubic feet; and of this quantity 11,498 cubic feet were sold. The residuals were: Coke, 120,450 tons; tar, 1,980,848 gallons; sulphate of ammonia, 2224 tons—the makes per ton of coal only being respectively 12·99 cwt., 10·42 gallons, and 27·11 lbs. The returns from residuals were equal to 72·3 per cent. of the cost of coal.

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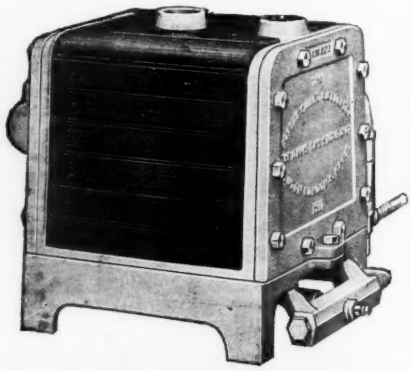

NOTTINGHAM GAS CHARGES AND METER-RENTS.

Much is being made during the progress of a municipal bye-election now occupying attention in Nottingham, of the question of a reduction in the price at present charged locally for gas, and incidentally of the suggested abolition of meter-rents. The latter subject has been more than once debated in the Council, and, while it has been admitted that there is a great deal to be said in favour of the abolition, a policy of hastening slowly has been commended; it being argued that, in the present state of the market ruling the price of raw materials, the time for the step is scarcely opportune. Mr. Alderman A. Ball, the Chairman of the Gas Committee, addressing a meeting in St. Ann's Ward last Wednesday evening, sounded a note of warning in relation to both matters; observing that there was not a member of the Committee who was not desirous of reducing the price of gas, and who would not be delighted to abolish the gas-meter rents, but the things must be dealt with upon sound business lines. He asked the ratepayers to consider whether, at a period when coal costs more than it has done for many years, and residuals are selling at a largely diminished rate, and at a time also when attempts are being made to improve the condition of those who are working for the Corporation—the expense of production increasing on all sides—it was desirable to reduce the price of the commodity that was being manufactured. The reasoning, upon general grounds, is obviously incontestable; but in Nottingham it is felt, especially by the larger consumers, that the Corporation gas profits have been too long made to serve inordinately as the means for a reduction of the municipal rate, to which all do not contribute in equal proportions.

NELSON GAS DEPARTMENT.

The Past Year's Working—Economy of Vertical Retorts.

The Engineer and General Manager of the gas undertaking of the Nelson Corporation (Mr. A. Morton Fyffe) has presented to the Gas Committee his report for the year ended the 31st of March last. It furnishes the following information.

The expenditure on revenue account was £44,829, or £3914 less than the estimate; while the income was £67,403, or £739 more. The result is a gross profit of £22,573 and a net profit of £7866, which is £4864 in excess of the estimate. The gross profit is the largest ever made by the department. During the year 33,101 tons of coal were carbonized; and the total cost, delivered at the works, was £24,106, giving an average cost of 14s. 6¼d. per ton, compared with 13s. 4d. in 1912-13, and 11s. 5¾d. two years ago. The net income from residuals was £13,139, or 7s. 11d. per ton of coal; making the net cost of the coal 6s. 7½d. per ton, compared with 4s. 10½d. and 3s. 8d. per ton in the two preceding years. The total quantity of gas made was 443,814,000 cubic feet, of which 1,914,000 cubic feet was carburetted water gas. The proportions of the two gases were: Coal gas, 99·5 per cent.; carburetted water gas, 0·5 per cent. In the manufacture of the latter gas, 5625 gallons of oil and 30 tons of coke were used. The quantity of gas delivered was 443,582,000 cubic feet—an increase of 25,818,000 cubic feet, or 6·18 per cent., on the preceding year. Of the total, 225,337,487 cubic feet, or 50·80 per cent., was consumed through ordinary meters, and 154,729,800 cubic feet, or 34·88 per cent., through those on the prepayment system. There were now 6481 ordinary and 8259 prepayment consumers—an increase of 447 on the year. The number of cookers, boilers, and fires on simple hire is 3996, compared with 4048; but Mr. Fyffe says the decrease is more than compensated for by the purchase of appliances to replace those on hire from the department. The capital account stood as follows at the close of the financial year: Gross outlay, £237,144 16s.; expended during the year, £7024 12s. 3d.; repaid during the year, £10,850 11s. 6d.; net capital outlay, £117,560 9s. 8d., or at the rate of £265 per million cubic feet of gas made. Ten years ago, the figure was £571.

Mr. Fyffe says the vertical retort installation at the Leeds Road works has been in use for two full winters, and the results obtained have exceeded expectations. In his last annual report, he gave the savings effected during the first six months the plant was at work; but he is now able to state the results of working during the complete financial year 1913-14. Labour charges show a saving of £1793; coal, £1437; coke, £500—making a total annual saving of £3730; while the capital charges on the installation amount to £1813. It has thus been possible to extend the producing capacity of the works 24 per cent., and have an extra annual profit of £1917 after paying all charges. The vertical retort installation at the Brierfield Gas-Works is in progress, and it is hoped to have the plant completed and put to work early next winter. No producing plant is being displaced by this installation, so that when completed the capacity of the works will be increased considerably. At these works, where inclined retorts are at present in use, the saving by the operation of vertical retorts will not, Mr. Fyffe says, be so great as it has been at the Nelson works, where previously the system of carbonizing was very antiquated. Nevertheless, the savings that will be effected by the introduction of the vertical system at Brierfield will cover the capital charges on the installation.

In other parts of his report Mr. Fyffe states that it has been decided to replace the sulphate of ammonia plant, which is completely worn out, by some new and modern plant; and the work will be undertaken during the summer. It is proposed to adopt the "semi-direct" process of ammonia recovery, which will only give one-third of the present amount of waste effluent to be discharged into the sewers, while it is anticipated that a larger yield of sulphate of ammonia per ton of coal carbonized will be obtained. Mains have been laid from the Leeds Road works to the centre of the town to convey gas at high pressure (80 inches of water) for public and shop lighting. Many appli-

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cations have been received for high-pressure lamps for exterior shop lighting.

In the course of some general remarks, Mr. Fyffe says the year under review is the most successful the Gas Department has had, when the prices paid for raw materials and those obtained for residuals are taken into account. The fact that the profit greatly exceeded the estimate is in large proportion due to the results obtained from the operation of the installation of continuous vertical retorts being far in advance of the most sanguine anticipation. He points out that though the wages of all the employees have been very much advanced during the past four years—in some cases 10 per cent., and in the case of all the foremen and stokers, &c., by as much as 15 per cent.—the cost of labour has decreased from 6d. per 1000 cubic feet of gas made in 1910, to 4·63d. in 1914. On the quantity of gas made during the past year this equals a saving of £2533 per annum. When the vertical system of carbonization is in operation at the Brierfield Works, and the department settles down to steadier working than is possible when large alterations or extensions are in progress, it is hoped that even better results will be obtained, although the prospects in the residuals market are not by any means encouraging.

SMETHWICK GAS UNDERTAKING.

Proposed New Holder.

On Saturday afternoon, the Smethwick Gas Committee issued a report concerning the position of the undertaking and the proposed new holder, which has become necessary in order to satisfactorily cope with the increased requirements.

The report states that the question of the provision of an additional holder dates back to the year 1901, when the Smethwick Corporation Act authorized the borrowing of £89,000 for gas-works purposes. This amount included £20,000 for the erection of a new holder. In 1904 the annual output of gas was 354 million cubic feet, which had increased to 578 millions in 1913; while the maximum daily output had now reached 3 million cubic feet, or two-and-a-quarter times the present storage capacity.

The Committee have been able to delay the erection of the new holder for some time, owing to the duplication of the water-gas plant in 1906. But ever since that period the question has been constantly in their minds; and they feel that the time has now arrived when the matter should be proceeded with, as under the most favourable conditions it would be at least two years before the holder could be completed.

The site which the Committee recommend the Council to adopt is within the borough, on the town's own land in High Park Road. A trial hole has been sunk to a depth of 50 feet, with the result that the Engineer considers it quite suitable.

LIGHTING OF GLASGOW STREETS.

A Report by the Inspector of Lighting.

Mr. S. B. Langlands, the Inspector of Lighting for the Corporation of the City of Glasgow, has just issued a very interesting note regarding the lighting of the public streets, from the earliest records of such operations down to the present time.

After tracing the gradual improvement of matters from the year 1718, with its tallow candles, and 1765 with oil lamps, Mr. Langlands comes to 1817, in which year the City of Glasgow Gaslight Company had 1472 lamps in the streets. Gradually matters improved until in the year 1869, the Corporation having acquired the works of the Gas Companies, the sum of £17,501 was charged to the Lighting Department for the gas used in public lighting. Of this sum £8490 was for the lighting of common stairs. In 1877 the number of street lamps in the city was 5155, each with a single jet, burning 1 cubic foot of gas per hour. In 1878 these were changed to burners consuming 2 cubic feet hourly per lamp—the total number of lamps then being 7196. In 1895, the number of public street lamps was 13,672.

At the present time (1914) the lighting of the city is effected by means of 19,437 gas-lamps in the public streets, consuming about 248 million cubic feet per annum. There are also 1541 electric lamps in the public streets. In private streets and courts there are 5985 incandescent burner gas-lamps, 542 flat-flame burner gas-lamps, and 126 electric lamps. The consumption of gas in private streets and courts is annually over 36 million cubic feet. The common stairs are lighted by 66,325 incandescent stair burners, 14,395 jet burners, and 3449 electric stair lights. The consumption of gas in the lighting of common stairs is annually about 251 million cubic feet.

The total number of gas-lamps in Glasgow is, therefore, 106,684, with a total annual consumption of 535½ million cubic feet. The total number of electric lamps throughout the city is 5116.

It is interesting to note, Mr. Langlands remarks, the huge consumption of incandescent gas-mantles in the lighting of the city. For the year ending May 31 last year the figures were as follows:

Upright mantles used in public street lamps . . .	209,182
Inverted ,, ,, ,, ,, ,, . . .	21,542
,, ,, ,, private street and court lamps	42,644
,, ,, ,, common stairs	119,019
	392,387

There are about 1050 employees in the department; the estimated wages for the current year (ending May 31) being:

Street lighting	£19,973
Stair lighting	36,185
Workshops	1,850
Lamp-fitters	1,663
	£59,671

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The total cost of the lighting of the city is: Public streets, £68,004; private streets and courts, £8502; common stairs, £62,360—total, £138,866.

Year.	Number of Lamps.	Quantity of Gas. Cubic Feet.	Number of Stair Lights.	Quantity of Gas. Cubic Feet.	Number of Men.	Total Quantity of Gas. Cubic Feet.
1869-70	Public, 7,483	31,565,400	17,284	39,188,400	294	81,358,500
	Private, 3,174	10,604,700				
	Total, 10,657	42,170,100				
1874-75	Public, 7,873	39,306,661	22,104	52,124,000	306	103,179,657
	Private, 3,136	11,748,996				
	Total, 11,009	51,055,657				
1879-80	Public, 8,385	62,746,196	26,254	67,905,055	354	146,322,690
	Private, 3,198	15,671,439				
	Total, 11,583	78,417,635				
1884-85	Public, 8,885	74,648,035	27,279	72,656,123	395	164,977,957
	Private, 3,249	17,673,799				
	Total, 12,134	92,321,834				
1889-90	Public, 9,658	96,158,771	29,501	77,248,339	421	191,049,030
	Private, 3,323	16,641,920				
	Total, 12,981	113,800,691				
1894-95	Public, 13,062	126,251,675	37,527	98,553,235	548	249,209,495
	Private, 4,262	24,404,585				
	Total, 17,324	150,656,260				
1899-1900	Public, 14,751	136,545,620	52,439	140,621,500	710	305,741,435
	Private 4,667	28,574,315				
	Total, 19,418	165,119,935				
1904-05	Public, 14,753	182,946,691	60,462	164,168,279	789	385,106,760
	Private, 5,843	37,991,790				
	Total, 20,596	220,938,481				
1909-10	Public, 16,740	215,572,972	64,993	192,595,456	823	449,682,345
	Private, 5,834	38,279,073				
	Total, 22,574	253,852,045				
1913-14	Public, 19,437	248,000,000	84,169	251,300,000	1050	535,500,000
	Private, 6,527	36,200,000				
	Total, 25,964	284,200,000				

DUBLIN TOWNSHIPS ELECTRIC LIGHTING SCHEMES.

Blackrock Council and the Alliance Gas Company.

A Special Meeting of the Blackrock Urban Council held Monday of last week was informed by Mr. C. P. O'Neill, Law Agent, that Messrs. D. & T. Fitzgerald, Solicitors to the Alliance and Dublin Consumers' Gas Company, had intimated that they were prepared to carry out the terms of an agreement of July, 1913, if the Council withdrew their opposition to the Company's Electric Supply Bill affecting Blackrock and other Dublin townships, and lent support in passing the Bill through Parliament. Counsel, however, had, said Mr. O'Neill, advised that the proposal should not be accepted.

Mr. Wallace expressed surprise that there had been any consent of withdrawal from the agreement of July last between the Gas Company and the Council. He denied that the Electricity Committee had been empowered in the matter, and held that anything that had been done to nullify the agreement or to have it withdrawn was on the part of the Gas Company. The Council's whole allegation of dishonourable treatment on the part of the Gas Company was, he said, that, notwithstanding repeated applications, the Company refused to ratify the agreement or put it in a legal position. This was the cause of the Council's opposition to the Bill—the refusal to incorporate the agreement in the Bill.

Mr. Stokes said that, having decided to oppose the Bill, they could not make terms with the Gas Company until they got the resolution off the books.

It was moved by Mr. Sexton that evidence be given before the Parliamentary Committee in opposition to the Gas Company's Bill, and in support of the scheme adopted by the Council for the production of current to supply electricity for public and private lighting in the township. He argued that, unless the Council opposed the Gas Company's Bill, the ratepayers would lose heavily, and the Council would lose their Provisional Order. The Company had not acted in good faith in regard to embodying the July agreement in the Bill; and no purpose could be served by having further controversy with the Company, whose object was simply to secure a monopoly for the lighting of the district. He did not believe the Company were intended to supply electric light; and if they obtained their Act, they would be in a position to charge 7d., and in some cases 8d., per unit for any number under 20 units. If councillors supported their own scheme, they could have electric light at 5d. per unit, and at a much earlier date.

Mr. Stokes said they ought to know how they stood; and he moved, as an amendment, that the Chairman, the Town Clerk, the Law Agent, and Mr. Tierney proceed to London to give evidence against the Bill, and that an order be made out for parliamentary and legal expenses amounting to £100. He said he had limited the number of the deputation to prevent what he called a "public scandal."

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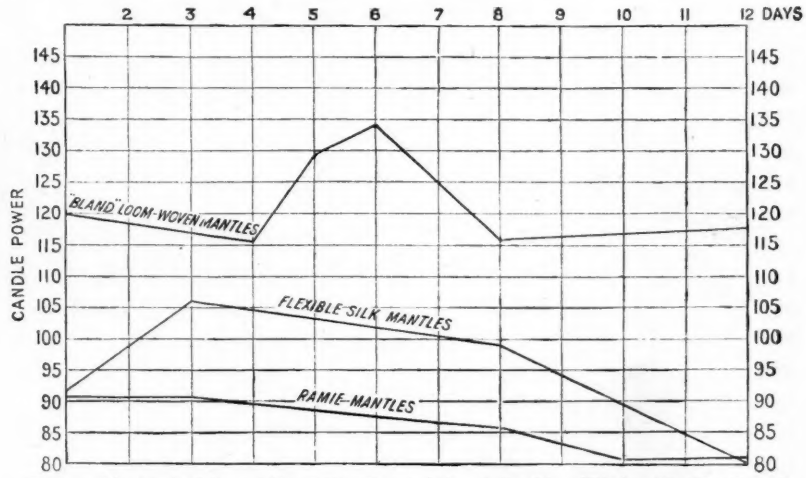
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On a division, the amendment was lost by 11 votes to 7.

Mr. Sexton proposed, as a deputation to London, the Chairman, Vice-Chairman, Town Clerk, Law Agent and Counsel, and Messrs. Murphy and Tierney; and this was carried.

RATEPAYER'S STRONG PROTEST.

In a letter to the Press, Mr. Thos. A. Murphy, of Blackrock, points out, in reference to the Council's opposition to the Gas Company's Bill, that, "before a blow has been struck," Counsel's fees and witnesses' expenses amount to £180, or 1d. in the pound on the rates. He says no local scheme can pay. Personally, he is against any and every electric lighting scheme, as, in his opinion, they already have in the district a good lighting and cooking system. It ought, he contends, to be possible to arrange with the Gas Company that the scheme will not be more costly than is right and fair, "without ruining the ratepayers by cumbrous deputations, voluminous expenses, and a white elephant of an electric lighting scheme."

METER-TESTING AT OLDHAM.

Borough Official Tester's Annual Report.

The report has been issued as to the official inspection of gas-meters made during the year to March 25 in the County Borough of Oldham by Mr. George W. Kay. He says that the number of meters tested was 55,142, of which 39,664 were new meters and 15,478 were old ones repaired—a decrease of 825 on the total number tested the previous year. The testing fees amounted to £1578 10s. The total number of meters tested in the Oldham office since it was opened in October, 1861, is 1,436,978; and the fees have amounted to £43,779. The receipts last year were £836 more than the expenditure; and out of the balance in hand, the sum of £940 has been transferred to the borough fund.

The report gives in tabular form the number of meters tested, with the fees for each meter-maker, and the number of wet, dry, and prepayment meters. The number of large meters (from 20 lights to 1500 lights) tested was 1421. During the year, 8 meters were tested and stamped to be used for measuring gas at high pressure—*i.e.*, pressures ranging from 1 lb. to 5 lbs. per square inch.

On this part of his report, Mr. Kay remarks: Gas being highly compressible, it follows that its volume is reduced as the pressure is increased; and in order to compensate for the loss of volume due to increase of pressure, these meters have been fitted with a cleverly contrived index which records the amount of gas passed through the meter at its original volume—*i.e.*, the volume it occupied before compression. In order to prove the correctness of this compensating device, these meters were put to very rigorous tests under my own supervision. First a soundness test was imposed, of 7 lbs. to the square inch; afterwards a series of registration tests ranging from 40 inches pressure to 140 inches water-gauge. The result of each test was that the percentage of error was within the limit allowed by the Sales of Gas Act. It is contended by some that inspectors have no legal authority to stamp such meters; but as inspectors are not legally forbidden, and believing them to be a just measure between buyer and seller, I have stamped and certified them correct. There is a growing demand for the supply of high-pressure gas; and a large number of towns have now power to instal this system of supply. Should many high-pressure meters be presented for stamping, we should require additional apparatus.

TABLE *showing the Number of Meters Tested, and the Result of Testing.*

Size of Meters.	Number of Meters Tested.	Number Stamped.	Number Rejected.
1 light	8	5	3
2	6,475	6,377	98
3	34,186	33,958	228
5	10,566	10,482	84
10	2,401	2,381	20
15	70	70	—
20	757	754	3
30	267	262	5
40	14	14	0
50	167	162	5
60	19	19	0
80	40	39	1
100	48	47	1
120	6	6	—
150	28	28	—
200	28	28	—
250	9	9	—
300	23	23	—
400	18	18	—
500	6	6	—
600	4	4	—
1000	1	1	—
1500	1	1	—

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Mr. S. B. Langlands, the Inspector of Lighting for the City of Glasgow, has just issued a pamphlet on "Lighting of Streets" in which he gives reproductions of photographs of different parts of Glasgow, showing the effect of high-pressure gas lighting, flame-arc lighting, low-pressure incandescent gas lighting, and views of the photometer room, stores, and offices of the Lighting Department. He also gives a very interesting summary of the work of lighting the streets of Glasgow since the first lamps were erected in 1718, when they were furnished with tallow wicks. In 1765 oil-lamps appear to have been in use; and it was not until 1818 that the Glasgow Gaslight Company first

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introduced gas lighting into the streets by an installation of 1472 lamps. A comparison of the difference in cost for public lighting in the city is shown by the amount expended in 1859, which was £6437, as against a present cost of £138,866. Of course, the burners in the early days were of the single-jet type, burning only one cubic foot per hour. At present there are in the public streets 19,437 gas-lamps and 1541 electric lamps. The consumption of gas is about 248,000,000 cubic feet for public lamps, and a further 251,300,000 cubic feet for the lighting of common stairs, in which there are 66,325 incandescent burners, 14,395 jet burners, and 3449 electric lights. The importance of the department is shown when it is considered that it has to deal with 535½ million cubic feet of gas annually. These figures, and the other information in the pamphlet, coming on top of the evidence given by Mr. Langlands, at the time of the Glasgow Corporation Provisional Order inquiry, give a full insight into the work carried out in the lighting department of a large city. Further reference to the pamphlet will be found on p. 284.

The additional carbonizing plant on the Woodall-Duckham system at the Aberdeen Gas-Works was formally inaugurated on Wednesday, on the occasion of the annual inspection by the Town Council of the gas-works. It may be remembered that the Aberdeen Corporation were the first in Scotland to adopt this particular system of vertical retorts; and many other Scottish towns have followed their lead. The installation is one of 20 retorts, which will be capable of producing 1½ million cubic feet of gas per day. The whole cost, including the new four-storey building to contain the plant, has been about £18,500. In the course of a speech by Mr. Sangster, the Convener of the Gas Committee, it was mentioned that the total capacity of the works is now 5 million cubic feet of gas per day, which gives a margin of 20 per cent. over the present maximum demand, and that the new plant would be able to turn out gas of a lower illuminating power than they had been getting with the horizontal retorts. Although to some this might appear a retrograde step, he pointed out that the rich gas was not now required for the incandescent burner, and that the calorific value required for heating and cooking would not be depreciated in the same proportion as the reduction in candle power. An illustrated description of the installation appears on pp. 239-40.

The Provost of Gourock has been making a vigorous protest against the resolution to erect the new gasholder, on account of its being too small and not likely to serve the town for a very lengthened period. He stated that the Council had come to the conclusion regarding the erection of the holder despite the adverse opinion of every gas engineer in Scotland whose opinion was worth having, and in defiance of their own Consulting Engineer and of the great majority of the ratepayers. He feared that the resolution would compel them in the not distant future to approach Greenock for a supply of gas. These remarks were not allowed to pass without comment. One councillor objected to the statement that the resolution had been adopted in defiance of their own Gas Engineer, as he, in answer to a specific question, had stated that, while the normal storage was equal to one day's consumption, they had provided for 1¾ days' storage. Other protests were also made against the Provost's statements, and the discussion ended without the Provost having been allowed to submit his motion of abandonment.

The Kirkcaldy Gas-Works question has moved forward a little during the week. Bailie Wright resigned from the convenership, and he expressed his thanks to the members of the Gas Committee for their assistance to him in the past. The Committee then discussed the question of the proposed extensions of the works, which, it may be remembered, was remitted back by the Town Council; and they decided to again recommend the reconstruction scheme. Should the Council not agree to this recommendation, it is said the Committee will all resign, as they have all already examined thoroughly each of the other schemes brought forward, and cannot alter their previous recommendation.

The question of the honorarium to Mr. M'Kee, the Cleansing Inspector of Falkirk, for the work he did in regard to the underpinning of the retort-bench, has again been before the Town Council at a special meeting, and the members, by a majority of 8 to 5, decided to grant him £100. This amount was not arrived at without a long discussion, in the course of which Mr. W. Wilson's share in the work was recognized in words. There was, however, no question of an honorarium to him; and it is safe to say that a large share of the work devolved upon him, and it is to him the Council will look for the permanence of the work. Surely his services should also be remunerated for this special work when such a handsome sum can be given to another official of the burgh. The "Falkirk Herald" very pertinently points out that the cost of the work for which this honorarium has been granted is £1082, and that, "had a professional gentleman been appointed, with the requisite knowledge in regard to it, he would have been satisfied with remuneration at the rate of 5 per cent. on the cost of the undertaking, which would have amounted to about £55." There is no question that the work has been well done, as the architect appointed to check the levels from time to time reports a maximum difference of ½ inch only, and nothing at all since February. This gentleman also requires remunerating; while Mr. Alex. Wilson, of Glasgow, has also received £25 for coming to Falkirk and examining the bench while it was subsiding. If the Council also decide, as they should, to properly remunerate Mr. W. Wilson, then indeed the work will be a costly one in fees and honorariums. There is, however, in all the talk and payments one very satisfactory point for the gas consumers of Falkirk, and that is that the work has been thoroughly done, and the trouble which threatened has been avoided. Mr. W. Wilson will at least feel easier in his mind, if his pocket is no heavier; and in this he will receive some return for his work in the matter. At a meeting of the Gas-Works Committee, Mr. Wilson was asked to report on the question of high-pressure gas.

Bury Wages Increased.—The Gas Committee of the Bury Corporation have increased the wages of the labourers to 5¾d. per hour.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *April 27.*

The report for the London market was unfortunately omitted last week; but there are no changes to record. Pitch remains firm at 38s. to 38s. 6d. per ton. The demand for benzol is maintained at 1s. 2d. per gallon net, packages extra. Solvent naphtha, 90-160, is 10¾d. per gallon, and 90 per cent. toluol 11½d. to 1s. per gallon, both net and naked. Pyridine is firm at 8s. 3d. to 8s. 6d. per gallon net, filled into buyers' packages. Anthracene, 40-45 per cent., is 2d. per unit net, casks free. For creosote in bulk, at least 3⅜d. per gallon net is readily obtainable.

Sulphate of ammonia continues quiet, and sellers' price for 25 per cent. quality remains without change at £11 17s. 6d. per ton net, at sellers' works, filled into buyers' bags. Buyers would probably pay only 2s. 6d. or 5s. below this figure.

Tar and Tar Products in the Provinces.

April 27.

The average values during the week were: Tar, 25s. 9d. to 29s. 9d. Pitch, east coast, 37s. to 37s. 3d.; west coast, Manchester, 36s. to 36s. 3d.; Liverpool, 36s. 6d. to 37s.; Clyde, 36s. 3d. to 36s. 6d. Benzol, 90 per cent., naked, North, 10¼d. to 10½d.; 50-90 per cent., naked, North, 10d. to 10¼d. Toluol, naked, North, 10½d. to 11d. Crude naphtha, in bulk, North, 4¾d. to 5¼d. Solvent naphtha, naked, North, 9¼d. to 9¾d. f.o.b. Heavy naphtha, naked, North, 9d. to 9¼d. f.o.b. Creosote, in bulk, North, 3¼d. to 3½d. Heavy oils, in bulk, 3⅜d. to 4d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 0½d. to 1s. 1d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1¾d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *April 25.*

During the past week there has been a fairly good demand for April delivery, but the supply has proved sufficient for all requirements, and towards the close prices have been inclined to give way slightly. To-day's quotations are £12 3s. 9d. per ton f.o.b. Hull, £12 5s. per ton f.o.b. Liverpool, and £12 7s. 6d. per ton f.o.b. Leith. So far as the forward position is concerned, the market has remained somewhat idle. Producers have still held for £12 per ton f.o.b. good port, monthly July-December, but buyers have persistently refused to pay this figure.

Nitrate of Soda.

This market is again easier, and the spot values are now 10s. 1½d. per cwt. for ordinary, and 10s. 4½d. for refined quality.

From another source it is reported that there is very little business doing in sulphate of ammonia; and notwithstanding the efforts on the part of some to hold the price up, yet, in order to do business, manufacturers have had to lower their quotation. Outside London, makes to-day are quoted at £11 5s; Hull, £12 3s. 9d.; Liverpool, £12 5s.; Leith, £12 6s. 3d.; Middlesbrough, £12 3s. 9d.

COAL TRADE REPORT.

Northern Coal Trade.

There is some quietness in the northern coal trade; the additional demand due to the Yorkshire strike having now passed away. Steam coals are inactive. Best Northumbrians are about 13s. 9d. per ton f.o.b.; second-class steams are 12s. 3d. per ton; and steam smalls are from 6s. 6d. to 7s. 6d. The production is steady; and the opening of the Baltic trade is helping in the distribution of steam coals especially. In the gas coal trade, there is a good prompt demand; but in that for future delivery there is a weaker tone as to prices. Best Durham gas coals are about 13s. 9d. per ton f.o.b.; second-class gas coals are from 12s. 6d. to 12s. 10½d. per ton; and "Wear specials" are near 14s. per ton f.o.b. One or two contracts for gas coals for foreign users have been settled, but particulars are not so easy to give. Buyers, however, have the advantage of a slightly lower price for the coals, and also of a fall in the cost of the sea carriage. Other contracts are in course of negotiation. Coke is quiet. Gas coke is not being so largely added to the stocks; the shipments from the Tyne being much heavier this week. Good makes vary rather more in their price, and are from 12s. 3d. to about 13s. 3d. per ton f.o.b. in the Tyne.

Blackburn's Costly Strike.—Though all the Blackburn Corporation Committees have not settled their estimates for the coming year, it is stated on good authority that the rates will be increased by 2d., thus bringing the total up to 8s. 2d. in the pound—a figure never previously equalled in the 63 years' history of the borough. The recent gas strike accounts for some, but not all, of this extra cost. In 1913, the gas undertaking made a profit of £10,000, which went to the reserve fund; but this financial year there is a loss of about £10,000.

Malvern Gas Undertaking.—Moving the adoption of the report of the Gas and Electricity Committee of the Malvern Urban District Council, Mr. Moerschell said he was voicing the opinion of the whole of the Council in expressing regret that they were losing the valuable services of their Engineer (Mr. W. H. Johns). During the short time he had been with them, he had effected very considerable improvements and saving; and they might have expected great things from him had they been fortunate enough to retain his services. They parted from him with great regret, but wished him every success in his new position as Gas Engineer at West Bromwich. It was a great point in his favour that he had been selected for so important a post.

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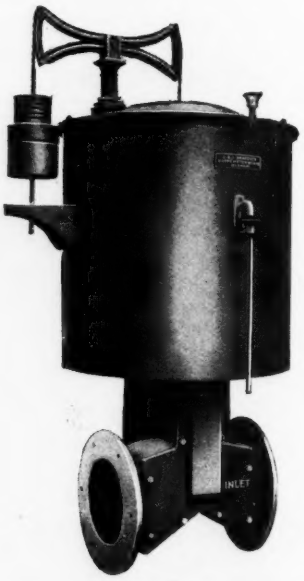

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Sale of Stocks and Shares.

The sale conducted by Messrs. A. & W. Richards at the Mart, Tokenhouse Yard, E.C., last Tuesday, included three new issues of capital by order of Directors. The first lots offered consisted of an issue of £5000 of 4 per cent. perpetual debenture stock of the Southend Water Company; and they were all placed at £90 10s. to £91 10s. per £100 of stock. Next came an issue of 500 new ordinary £10 shares in the same Company, ranking for a maximum dividend of 5 per cent., but carrying from the date of purchase the present rate of 4½ per cent.; and they fetched £9 to £9 2s. 6d. each. An issue of £6000 of additional "B" consolidated stock of the Watford Gas Company, ranking for a standard dividend of 3½ per cent., subject to the sliding-scale, but entitled, equally with existing similar stock, to £5 17s. 6d. per cent., was all sold at from £110 10s. to £115 10s. per £100 of stock. The third new issue was 400 "B" £10 shares (7 per cent.) in the Sevenoaks Gas Company; and they fetched from £12 10s. to £13 5s. apiece. Acting under instructions from executors, parcels of 5 per cent. ordinary and preference stock of the South Essex Water Company were offered for sale. The former stock, to the amount of £2300, was placed at £111 to £112 per £100; and the latter at £116 5s. per £100.

Tarapaca Water-Works Company.

A long discussion took place at the meeting of this Company in London last week, on the unsatisfactory position which has arisen in consequence of the action of the Chilian Government. The Chairman (Sir Robert Harvey) said that in the past year the Municipality had not in any way improved their attitude towards the Company, except for a certain expressed desire to treat for a settlement of their debt. The Company had gone to the Courts on the matter, and had been given the right to embargo the receipts of the town. An agreement with the Municipality had, however, been suggested; and it was hoped that it would lead to a successful issue. There was, too, trouble in another direction, owing to the threat of the Government to carry out a water scheme in Iquique. This matter had been the subject of a petition by the Company to the Government, which showed that the situation was not one that the authorities in Chili could ignore or allow to remain as at present. In answer to questions, he pointed out that the Company had no monopoly. The Government or anyone else could arrange to build water-works; and if the opposition was run on business lines, the Company would not complain, because they could then sell water as cheaply as anyone. But the case was different if the water was to be provided and distributed at about half the amount of money it cost the Company to put it into Iquique. It was an undertaking which, if established, would annihilate the Company. Their chief hope was in the justice and honour which had up to the present characterized the Chilian Government in all their dealings. A final dividend of 4 per cent., making with the interim dividend 8 per cent. for the year, was declared; £20,000 was placed to the reserve fund; and £14,418 was carried forward.

Gas Exhibition at Colchester.

There is being held in the Public Hall, Colchester, a successful gas exhibition, promoted by the Gas Company, and directly supported by the Richmond Gas Stove and Meter Company, Limited. In addition to an excellent array of the firm's gas cookers and fires in the main hall, there have been fitted up a model kitchen (with various types of gas-heated boilers, &c.), an industrial room (with gas-engines), a working laundry (with gas-heated irons), and a dining-room, drawing-room, and bedroom—fitted with suitable patterns of fires made by the firm. "Nico" lighting appliances are shown, for inside and outside illumination. The opening ceremony was performed by the Deputy-Mayor (Mr. W. Coats Hutton); the gathering being presided over by Alderman Henry Laver (the Chairman of the Gas Company), who said the Gas Company were one of the largest ratepayers in the town—every 1000 cubic feet of gas sent out costing over 2d., and he believed nearly 3d., for rates. The Deputy-Mayor remarked that, looking over the exhibition, he was struck by the enormous strides made in recent years in the practical application of gas for domestic purposes. Alderman W. Gurney Benham, in proposing a vote of thanks to the Deputy-Mayor, said it was an interesting circumstance that this was practically the centenary of gas making in Colchester. The first gas made was manufactured within a few yards of that exhibition, in the High Street, by his great grandfather, Mr. Samuel Carr, who made it in his back garden, and supplied his neighbours with it. Colchester was considerably in advance of some other places in regard to gas making; its streets being lighted by gas more than ninety years ago. Mr. H. M. Thornton, on behalf of the Richmond Company, thanked the Chairman for presiding. A cookery lecture was then given by Miss Florence Surridge; and tea was taken on the invitation of the Chairman. Mr. W. W. Townsend (the Engineer and Manager of the Gas Company) and all responsible for the arrangements, are to be congratulated on the exhibition.

Manchester Water Supply.—The annual report just issued by the Manchester Water-Works Committee shows that the total income for the year ended March 31 last was £441,878. After deducting the expenditure there was a surplus of £6616; but included in this amount there is an item of £5576 discount on 3 per cent. consolidated stock repurchased.

Fires Caused by Short Circuits.—An outbreak of fire which occurred at Frascati's Restaurant, Oxford Street, last Wednesday morning, was attributed to a defective electric circuit. The outbreak originated in the serving-lift in the basement kitchen; and the flames quickly spread to the upper floor. The outbreak was soon subdued, but not before the lift and well to the upper floor had been severely damaged. Messrs. A. Parsons and Co.'s electrical and turbine works at Gateshead were on Saturday morning the scene of a fire which destroyed the roof and threw a large number of men out of work. Again the cause assigned for the outbreak was the short-circuiting of an electric wire.

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Reduction in Price at Rhyl.—The Rhyl Urban District Council have reduced the price of gas per 1000 cubic feet from the 1st inst. for the following consumptions per quarter: Under 50,000 cubic feet, 1d.; over 50,000 and under 100,000 cubic feet, 2d.; over 100,000 and under 250,000 cubic feet, 3d.; over the last-named quantity, 5d.

Dewsbury and Heckmondwike Amalgamation Vetoed.—In reference to the proposal to amalgamate Heckmondwike with Dewsbury, which was lately the subject of an inquiry, intimation has been received from the Local Government Board that, having carefully considered the report of their Inspector (Major Norton), together with the evidence given at the inquiry, they have come to the conclusion that the circumstances do not at the present time warrant the extension of the borough of Dewsbury as proposed.

Municipalities and Higher Wages.—The Special Committee appointed by the Liverpool City Council to consider the conditions and wages of Corporation workmen have recommended that the minimum wage should be increased from 24s. to 25s. per week; that a week's holiday, with pay, should be granted; and that for labour on Christmas Day and Good Friday the payment should be at double rates. Labourers receiving more than the minimum wages will also get an advance of 1s. Altogether 4000 men are expected to benefit by the concessions, which will cost the city £7000 a year. Several municipalities and private firms have recently gained the victory in struggles with their workers; but the cost to both sides has been enormous. The Leeds trouble cost the ratepayers over £100,000, and Blackburn cost well over half as much; so that, in making the concessions referred to, Liverpool may be regarded as acting on economical lines.

Gas and Electricity at Ryde.—The Ryde Town Council have accepted the tender of the Gas Company for the street lighting for three years; the price to be £745 per annum. The Company offered, if a six years' contract were entered into, to reduce this figure to £715 4s.; but the Council thought this would be too long a period over which to bind themselves—not only electricity but "petrolite" also being quoted as possible substitutes. At the same meeting the members agreed to the lighting of the large hall by electricity. There will be five lamps, the payment for which is to be spread over three years, by quarterly instalments. It was pointed out that the Electric Light Company had undertaken to maintain the lamps for a year without extra charge, and to do so for two additional years at an annual charge of about £1 each; while the difference in the cost of installation represented a saving of £34. Samples of gas and electric lights had been temporarily fitted up for inspection.

Chelmsford Water Supply.—At the meeting of the Eastern District Division of the Institution of Municipal and County Engineers at Chelmsford on the 18th inst., the Borough and Water Engineer (Mr. Percival Harrison) submitted a paper, in the course of which he gave some particulars as to the water supply. He said the population had increased from 12,580 in 1901 to about 20,000 now, due partly to a boundary extension in 1907. The present rate of increase was about 1000 per annum, and this had created a tendency to overcrowding and placed a strain on the resources of the water undertaking, which is the property of the Corporation. The present sources of supply are four in number—viz., Mildmay Yard (borehole), Burgess Well (gravel spring), Admirals Park (gravel spring), Springfield (surface springs and a borehole belonging to the Chelmsford Rural District Council). Under the advice of Mr. Harrison's predecessor, Mr. Cuthbert Brown, now Engineer to the Edmonton Urban District Council, the Corporation purchased a piece of land at Galleywood for the purpose of sinking a borehole to augment the other sources of supply; and Mr. Harrison's first work on taking office about three years ago was to push forward with this scheme.

San Paulo Gas Company, Limited.—At the annual meeting of this Company on the 8th prox., the Directors will express regret at having to report that, though the sales of gas during the year ended Dec. 31 showed an increase of more than 12 per cent. as compared with the quantity sold during 1912, the profits earned were some £11,000 less. This result, they explain, is due chiefly to the increased cost of coal and freights, and, in the latter months of the year, to the difficulty experienced in disposing of residual products at satisfactory prices in consequence of the acute depression in business prevailing in Brazil. Steps have been taken to improve both the capacity and the efficiency of the gas-works pending the erection of the new works referred to in the last report. The Directors have consolidated the separate reserves of the Company into one general account, which, with the sum of £11,276 transferred from profit and loss, now stands at £125,000—a sum equivalent to the amount of 5 per cent. debentures of the Company now outstanding. After providing for all expenses and charges, including the appropriation for financial management and for debenture interest and the dividends on the preference and ordinary share capital for the year 1913, each at the rate of 6 per cent. per annum, and the transfer of £11,276 to the general reserve, there remains a balance of profit of £37,583 to be carried forward.

Queenstown Public Lighting.—The Queenstown Urban Council last week considered tenders from the Gas Company and the Electric Light Company for public lighting. The Gas Company, for 142 town lamps, offered to continue for one year or three years at the rate of 60s. per lamp per annum, being an increase of 5s. per lamp, which the Company said was necessitated by the great increase in wages, cost of coal, and all-round expense of production. The Electric Light Company also quoted for one year or three years. In reply to a deputation from the Council, the Gas Company intimated that if the Council would increase the number of lamps to be given to the Company they would see what could be done with a view to reducing the price of all lamps. The Chairman (Mr. C. O'Callaghan) said he had pointed out to the Company that this was an inopportune time to increase the price of gas, owing to the financial position of the town. Mr. Hennessy said the price of gas had been reduced to private consumers from 5s. 6d. to 3s. 8d. per 1000 cubic feet; and he could not understand why there should be an increase for public lighting. It was suggested that the Company be asked to revert to the old rate for three years; but the Chairman said they had refused to do this. It was then decided that the Town Clerk should ascertain the cost and candle power of gas supplied in other towns; the tenders meantime to stand over.

YOUR

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Birmingham Gas Department.—We are gratified to learn that there has been another large increase—just over 8 per cent.—in the output of gas by the Birmingham Corporation Gas Department for the year ending March last as compared with the previous year.

The Strike at Messrs. Fletcher, Russell, and Co.'s Works.—We are pleased to say that, at a mass meeting last Thursday of the strikers at the Warrington works of Messrs. Fletcher, Russell, and Co., it was decided to put an end to the trouble on terms which are mutually satisfactory. The result was that a few men were at once taken on to get things into order for the return of some 500 of the men this week; and the remainder of the men will be taken on again in about a month's time. The strike lasted fully two months.

Darwen's New Carbonizing Plant.—An increase in the rates at Darwen has only been avoided by strict economies in the working in the municipal departments, and grants from the gas, water, and electricity concerns amounting to £3500. The following are the contributions of the respective Committees: Gas, £2000; water, £1000; and electricity, £500. Last year £4000 was contributed from these departments for a similar purpose. It is predicted locally that about September next the new plant at the gas-works will have been installed, and that "if gas is then being made by the Munich system gas engineers in all parts of the country will show a special interest in the doings at Darwen, and particularly in the results. Because of the new system, Darwen may come to occupy the very favoured position of Widnes in the gas industry."

APPLICATIONS FOR LETTERS PATENT.

9235.—SCHOMBURG, L., "Pipe-sockets." April 14.
9271.—JOHNSON, J. Y., "Removal of carbon monoxide from gas mixtures" A communication from the Badische Anilin und Soda Fabrik. April 14.
9299.—CHRISTOPHER, J. E., "Gas-producers." April 15.
9302.—DAVIDSON, W. B, and LIVERSEDGE, A. J., "Washing gases." April 15.
9344.—HABER, F., and LEISER, R., "Tracing or determining admixtures or variations in the composition of gases." April 15.
9373.—MARGRETH, J., "Acetylene generators." April 15.
9479.—GLOVER, T., "Dry meters." April 16.
9480.—GLOVER, T., "Apparatus for regulating temperatures." April 16.
9481.—GLOVER, T., "Water-heater." April 16.
9499.—LULY, W., "Extracting volatile matters from coal, &c." April 16.
9524.—HARGER, J., "Removal of carbon dioxide from gases." April 17.
9525.—HARGER, J., "Sampling and analyzing gases." April 17.
9587.—CONGDON, R. C., "Manufacture of coal gas." April 17.
9618.—THEISEN, H. E., "Centrifugal gas-washers." April 18.
9623.—ROEMER, C. W. VON, and LYNDE, F. C., "Air-gas machines." April 18.

GAS COMPANIES IN THE STOCK EXCHANGE.

The Stock Exchange has had a miserable week. Markets crumbled away, and prices fell lower and lower day by day, and culminated on Saturday with the failure of a firm of position and importance. Apart from our own domestic troubles, not only were all the old factors for mischief abroad in full action, but these were added to by the ill-health of the aged Austrian Emperor, upon the thread of whose life hang such tremendous European questions. The pressure to sell was so great in Transatlantic and Continental bourses as to be irresistible, and all markets at home fell freely. Consols closed at a loss of 1⅛ in the week. Monday opened very dull, overshadowed by the Mexican tangle. Business was almost at a standstill—none wanting to buy; and few sellers being content to accept the slaughter-house prices offered. Consols fell ⅛. On Tuesday, the depression was general and pronounced. Government issues fell, and Consols lost ⅛ for the account. Rails could find no consolation in better traffics and relaxed tension in labour questions. The Foreign Market was gloomy, and Transatlantics were down, though later they were helped up a little by Wall Street. Wednesday was another dismal day. Government issues were all lower, and Consols lost ⅛ for money and the account Rails were very quiet and very dull. Americans alone could make any stand. Thursday came and went in profound gloom—not a ray of relief anywhere—and the tightening of money aggravated the position. Consols fell another ⅜ for money and the account. Rails went steadily lower, and Transatlantics gave way again. Things were as bad, if not worse, on Friday. All markets were crushed by heavy Continental sales Consols shrank another ¼. The Foreign Market was weak, and Transatlantics very bad. Saturday brought no amendment (the failure announced being a nasty blow); and markets in general were exceedingly depressed. Consols changed hands repeatedly at 74⅝, and closed ⅛ lower at 74½ to 74¾. The Money Market was very firm, and discount rates steadily stiffened. Business in the Gas Market was fairly good in point of volume, and the general tone was quite satisfactory, though one or two issues receded slightly from esoteric causes. In Gas Light and Coke, the ordinary was pretty active. After opening at 101¼, it marked 102½ repeatedly, and closed firm. In the secured issues, the maximum realized 78 to 78⅝, the preference 96½ to 97¾, and the debenture 74 to 75. South Metropolitan was very quiet and unchanged at 110 and 110½. In Commercials, there was one transaction in the 4 per cent. at 106, and one in the 3½ per cent. at 105. Among the Suburban and Provincial group, Brighton original changed hands at 207, ditto ordinary at 153, British at 44¾, Bournemouth "B" at 14¾, Ilford debenture at 94 (a rise of 4), South Suburban at 115¼, Tottenham "B" at 115 and 116, and (on the local Exchanges) Liverpool "A" at 211¾, Newcastle at 99¾, and Tynemouth at 109½. In the Continental companies, Imperial fell 2, with dealings at 170½ to 174, ditto debenture marked 84½. Union 81¾, and European 18⅝ and 18½. Among the undertakings of the remoter world, Bombay was done at 6⅜, Monte Video at 12 and 12 1/16, Primitiva at 6⅜ to 6 3/32, ditto preference at 5 to 5½, and River Plate debenture at 88½.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, 5 per cent. Consols, 74½—74¾. Previous week, 75⅝—75⅞.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	61—66*	−2	3 15 9	75,000	5	Dec. 11	6	Malta & Mediterranean	4⅜—4⅝	..	6 3 1
374,000	,,	Jan. 15	4	Do. 4 p.c. Deb.	78—81	..	4 18 9					Met. of Melbourne 4½ p.c. Deb.	98—100	..	4 10 0
280,000	5	Oct. 15	7½	Bombay, Ltd.	6—6½	..	5 15 5	250,000	100	April 1	4½				
50,000	10	Feb. 26	16	Bournemouth & Poole 10 p.c.	29—30	..	5 6 8	541,920	20	Nov. 27	4	Monte Video, Ltd.	11⅜—12¼	..	6 10 8
352,500	10	,,	7	Bournemouth Gas & Water B 7 p.c.	14½—15	..	4 13 4	1,775,892	Stk.	Feb. 26	4⅜	Newc'tle&G'tesh'd Con.	99½—100	−¼	4 10 0
75,000	10	,,	6	Pref. 6 p.c.	13½—14	..	4 5 9	529,705	Stk.	Dec. 30	8⅜	Do. 3½ p.c. Deb.	83½—84½	..	4 2 10
880,000	Stk.	Feb. 26	14	Brentford Consolidated	260—265	..	5 5 8	55,940	10	Feb. 26	7/14 0	North Middlesex 7 p.c.	12⅜—13⅜	..	5 14 1
330,000	,,	,,	11	Do. New	204—209	..	5 5 3	300 000	Stk.	Nov. 27	8	Oriental, Ltd.	120—125	..	6 8 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	..	4 10 1	60,000	5	Mar. 26	10	Ottoman, Ltd.	7¼—7⅜	..	6 9 0
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	93—95	..	4 4 3	60,000	50	Feb. 26	13	Portsea, Island B	127—130	..	5 0 0
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	206—211	..	5 4 3	100,000	50	,,	12	Do. C	118—121	..	4 19 2
244,200	,,	,,	8	Do. A Ord. Stk.	152—157	..	5 1 11	249,980	5	Oct. 15	8	Primitiva Ord.	6¼—6⅜	−⅛	5 18 6
530,000	20	Mar. 26	12½	British	44—45	..	5 11 1	499,960	5	Dec. 30	5	,, 5 p.c. Pref.	5—5¼	..	4 15 3
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	90—92	..	4 7 0	521,600	100	Dec. 1	4	,, 4 p.c. Deb.	93—95	..	4 4 3
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89—91	..	4 7 11	346,198	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	87—89	..	4 9 11
100,000	10	—	—	Cape Town & Dis., Ltd.	1—2	..	—	150,000	10	April 8	6	San Paulo 6 p.c. Pref.	10⅜—11¼*	..	5 6 8
100,000	10	—	—	Do. 4½ p.c. Pref.	2½—4½	..	—	125,000	50	Jan. 2	5	5 p.c. Deb.	48—50	..	5 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	73—78	..	5 15 5	135,000	Stk.	Mar. 12	10	Sheffield A	223—224	+½	4 9 8
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	106½—108½	..	4 12 2	209,984	,,	,,	10	Do. B	222—223	+½	4 9 8
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	..	5 1 2	523,500	,,	,,	10	Do. C	222—223	+½	4 9 8
560,000	,,	,,	5½	Do. 3½ p.c. do.	103½—105½	..	5 1 1	90,000	10	Oct. 15	7½	South African	10¾—11½	..	6 10 5
475,000	,,	Dec. 11	8	Do. 3 p.c. Deb. Stk.	71—73	..	4 2 2	6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	109—111	..	4 18 6
800,000	Stk.	,,	4½	Continental Union, Ltd.	80—83	..	5 8 5	1,895,445	,,	Jan. 15	3	Do. 3 p.c. Deb.	73—75	..	4 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	117—122	..	5 14 9	209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	155—157	..	5 8 3
492,270	Stk.	—	6	Derby Con. Stk.	123—125	..	4 16 0	952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	..	5 3 5
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11	60,000	,,		5	Do. 5 p.c. Pref.	110—112	..	4 9 3
1,002,180	10	Jan. 15	10	European, Ltd.	17⅞—18½	..	5 8 1	117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	113—115	..	4 6 11
16,386,660	Stk.	Feb. 12	4/17/4	Gas 4 p.c. Ord.	101—103	..	4 14 7	629,740	Stk.	Nov. 13	5	Southampton Ord.	101—104	..	4 16 2
2,600,000	,,	,,	3½	Light & 3½ p.c. max.	76—79	..	4 8 7	120,000	Stk.	Feb. 12	7⅜	Tottenham A 5 p.c.	135—138	..	5 6 10
4,062,235	,,	,,	4	and 4 p.c. Con. Pref.	96—99	..	4 0 10	543,940	,,	,,	5⅜	District B 3½ p.c.	115—117	..	5 0 5
4,674,850	,,	Dec. 11	3	Coke 3 p.c. Con. Deb.	73—75	..	4 0 0	149,470	,,	Dec. 30	4	4 p.c. Deb.	89—91	..	4 7 11
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	..	5 12 4	182,380	10	,,	5	Tuscan, Ltd.	5—6	..	8 6 8
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	16⅝—17½	..	6 7 6	149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—97	..	5 3 1
131,000	Stk.	Mar. 12	7⅜	Ilford A and C	151—154	+4	4 19 0	236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—110½	..	4 10 6
65,780	,,	,,	6⅜	Do. B	115—118	..	5 3 10					Wandsworth, Wimbledon, and Epsom—			
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	94—96	+4	4 3 4								
4,940,000	Stk.	Nov. 13	9	Imperial Continental	170—175	−2	5 2 10	30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151—156	..	5 7 4
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84—86	..	4 1 5	255,636	,,	,,	6⅜	,, B 3½ p.c.	129—134	..	5 2 7
200,242	Stk.	Mar. 12	6⅜	Lea Bridge Ord. 5 p.c.	119—121	..	5 7 5	108,075	,,	,,	5/17/3	,, C 3½ p.c.	110—115	..	5 2 0
561,000	Stk.	Feb. 26	10	Liverpool United A	211—213	..	4 13 11	352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	..	5 0 5
718,100	,,	,,	7	Do. B	143—145	..	4 16 7	98,000	,,	,,	6⅜	Epsom 5 p.c.	121—126	..	5 5 2
306,083	,,	Dec. 30	4	Do. Deb. Stk.	99—101	..	3 19 3	88,416	,,	Dec. 30	3	3 p.c. Deb. Stk.	71—73	..	4 2 2
63,480	Stk.	Dec. 30	3	Maidstone 3 p.c. Deb.	65—67	..	4 9 7								

Prices marked * are "Ex Div."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

LADY DEMONSTRATORS. Coventry Gas Department.
ASSISTANT. No. 5869
GAS ENGINEER AND MANAGER. Leek Urban District Council. Applications by May 6.
DRAUGHTSMAN. No. 5874.
DRAUGHTSMAN. Firth Blakeley, Limited, Dewsbury.
REPRESENTATIVE. No. 5870.
CHIEF CLERK. No. 5872.

Appointments, &c., Wanted.

LEADBURNER, &c. No. 5862.

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"D. G.," c/o Scripps's Advertising Offices, 13, South Molton Street, W.

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Patent Licence.

ACETYLENE GENERATORS. F. W. Golby, 36, Chancery Lane, W.C.

Sales of Stocks and Shares.

BOGNOR GASLIGHT COMPANY. London Mart. May 5.
DUNSTABLE GAS AND WATER COMPANY. London Mart. May 5.

Sales of Stocks and Shares *(continued)*.

FELIXSTOWE GASLIGHT COMPANY. London Mart. May 5.
HERNE BAY GAS AND ELECTRICITY COMPANY. London Mart. May 5.
NORTH MIDDLESEX GAS COMPANY. London Mart. May 5.
NORTHFLEET GAS COMPANY. London Mart. April 28.
SLOUGH GAS COMPANY. By Tender. May 14.
UNITED DISTRICT GAS COMPANY. London Mart. May 5.
WANDSWORTH, &c., GAS COMPANY. London Mart. May 19.

TENDERS FOR

Automatic Lighters.

Particulars only to No. 5871.

Coal.

BANGOR (Co. DOWN) URBAN DISTRICT COUNCIL. Tenders by May 19.
RAMSGATE CORPORATION. Tenders by May 11.
SHREWSBURY GAS COMPANY. Tenders by May 22.
THORNTON URBAN DISTRICT COUNCIL. Tenders by May 13.
UXBRIDGE GAS COMPANY. Tenders by May 11.

Coke.

SHEPPY GAS COMPANY.

Gasholder and Tank.

CARDIFF GAS COMPANY.
SKIPTON GAS DEPARTMENT. Tenders by May 6.

Lamp Columns.

CALCUTTA CORPORATION. Tenders by June 15.

Measuring Chambers.

ROCHDALE GAS DEPARTMENT. Tenders by May 6.

Retort-House, Coal-Store, and Retort Settings, &c.

CLONMEL GAS DEPARTMENT. Tenders by May 6.
CLACTON URBAN DISTRICT COUNCIL. Tenders by May 6.

Washer, Exhausters, Boiler, &c., Governors, and Weighing Machine.

MARGAM URBAN DISTRICT COUNCIL. Tenders by May 11.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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